ORGANIC GARDENING

MARCH 25¢ 1946

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With The Editor

A Debate

IN the Oct-Dec. 1945 issue of the *Garden Path* there is an article by Prof. Alex Laurie of Ohio State University entitled "What's Wrong with Chemical Fertilizers?" in which he states, "In recent years a revival of the old theory that 'chemicals' are injurious has developed, largely because of a publication called *Organic Gardening* which stresses the almost absolute necessity of the use of organic materials and ascribes all plant ills to the use of inorganic or 'chemical' fertilizers". Then Laurie goes on to say, "We are advised that bacteria in the soil are depleted or exterminated by the use of nitrate of soda, muriate of potash, etc., when actually such materials act as nutrients for the bacteria, which are microscopic plants." The professor leaves himself dangling, or shall we say that he has worded his thesis so artfully that he is not wrong exactly but he is far from right? You will see what I mean later.

Bacteria are everywhere, in the soil, in our bodies, in water. The great majority of them, probably over 90 per cent, are beneficent. Without them man would cease to exist. These bacteria are very specialized. Nature does not use shot-gun methods. For example in the manufacture of a vinegar which is made from distilled alcohol, there are four phases, each batch of material going through four generators. Otto Rahn, Professor of Bacteriology at Cornell University describes it in his recent book "Microbes of Merit" (Jacques Cattel Press—Lancaster, Penna.). "The bacteria in each generator become highly specialized, and if the vinegar from the first generator would go directly to the fourth, the bacteria would be completely upset by this unaccustomed food, and the generator would not function."

The same thing holds true in the soil in which each of dozens of groups of bacteria have specific functions. Shakespeare said that all the world is a stage and we are all actors thereon. That idea aptly fits the subterranean life in the soil. Each bacteria, mould, fungi, actinomycetes and the other sundry denizens of this little world within a world, awaits his cue. When conditions become right he struts upon the stage and does his stuff.

For example Cellulose is broken down by a limited number of organisms and each kind of microbe works under a rigidly limited range of conditions; it has one tiny function in a severely restricted part of the work of the soil processes. There are bacteria that can work only on ammonia, others on nitrites and still others only on nitrates. There are those (anaerobic) that come into play only when the soil becomes waterlogged. There

are others (thermophylic) that act only when extremely high temperatures are reached. There are organisms that operate only when sulphur comes within their physical contact, and here is where we begin to tilt with Professor Laurie. Lady Eve Balfour in *The Living Soil* states, "Sulphur-reducing bacteria produces H2S or other volatile sulphur compounds either from sulphates applied to the soil as chemicals, or from organic matter when normal decomposition is arrested. Such activity forms a vicious circle, since the H2S produced by the bacteria inhibits the activity, among others, of those fungi responsible for the decomposition of organic matter, and the resulting arrest of normal decomposition further encourages the production H2S."

In other words when superphosphate, one of the most common chemical fertilizers used, is applied to the soil there is an increase in the wrong kind of soil organisms. Superphosphate is just loaded down with sulphur and gives rise to the multiplication of sulphur-reducing bacteria, thus bringing about a condition which prevents some of the organic matter in the soil from breaking down.

Nature has worked with and through bacteria for millions of years without the benefit of superphosphate or nitrate of soda or muriate of potash or sulphate of ammonia. She employs a system of policing with the aid of such organisms as the penicillium molds which keep the soil bandits under control—the 10% of the soil's microbes which would upset the natural growing processes. When you bring "nitrate of soda and muriate of potash, etc." into the picture you are forcing Nature to strain at her resources, to bring into play subterranean Philistines, special armor-clad, six-ply little organisms that will gouge the eyes out of the corrosive chemicals. Sure, Professor Laurie, but what is their general effect on the biologic life as a whole of the soil? I will tell you. It's effect is to produce those very "plant ills" which you mention in the first paragraph of your article.

We can prove that "bacteria in the soil are depleted or exterminated by the use of nitrate of soda, muriate of potash, etc." Professor Selman A. Waksman in *Principles of Soil Microbiology* (Williams and Wilkins) says, "By comparing the influence of manure with inorganic fertilizers, Temple found that the addition of nitrate of soda to the soil increased the number of bacteria, as determined by the plate method from 6,500,000 to 8,480,000; the addition of a complete mineral fertilizer increased these numbers to 11,540,000, while stable manure brought about an increase to 23,310,000."

Sir E. John Russell in *Soil Conditions and Plant Growth* (Longmans Green) describes a bacterial count at the Rothamsted Agricultural Station in England. In a field treated with farmyard manure were counted 28,860,000 bacteria per gram of soil. Where complete minerals plus ammonium sulphate were used, only 15,100,000 bacteria were present." Lyon and Buckman in *The Nature and Properties of Soils* (Macmillan) say "All of the ordinary types of algae are greatly stimulated by the application of farm manure . . . . Algae, no doubt contribute to the organic content of the soil." None of these tests consider what the repeated yearly applications of well-finished composts would do to a soil. There is a tremendous difference between manure and composts. After land has received the benefits of compost dressings for perhaps ten years, the bacterial counts may become truly astronomic in their numbers. When nitrate of soda and muriate of potash are used there is an increase in an undesirable type of bacteria but a reduction in the beneficent types.

Then Professor Laurie states, "We are scolded for the advocacy of the use of superphosphate because it acidifies the soil, which is hardly the case." Here he again is hiding behind the

skirts of a statement which does not give the entire picture. Superphosphate does not make the soil acidic because of the large quantity of lime it contains, but that does not forgive the harm that the sulphur in it does. Laurie fails to dwell on the tremendous amount of sulphur in superphosphate which is extremely detrimental to the soil growing processes from a health standpoint. Sulphur is an out and out poison. It drives away earthworms which are so essential in the general equation of soil fertility. There is a theory that has been held by physicians that it is an important factor in the causation of human cancer.

Why did Professor Laurie single out only superphosphate in reference to the acidifying effect of chemical fertilizers? Is it because he considered it one of the few that might not possess this acidifying quality? Why didn't he mention ammonium sulphate, muriate of potash and the dozens of others that are tagged only with numbers?

Laurie goes on, "To say that the use of nitrate of soda or ammonium sulphate will produce a different taste in tomatoes . . . . than the use of tankage is mostly nonsense." We recommend that tankage be used only as one of the incidental ingredients of the compost heap. To develop the best taste in vegetables one must use a well-balanced compost consisting of both animal and plant matter. Animal matter alone, such as tankage, is an unbalanced fertilizer.

A few years ago in England Captain Wilson, a subscriber to Organic Gardening magazine, was faced with a problem. He is a truck farmer and had hundreds of acres of cabbages, raised organically with the use of composts exclusively. The market for cabbage that year, due to a glut, went all to pieces. He had been informed that when the truckers brought their cabbages to the wholesale centers, the buyers wouldn't even look at them.

He decided to take a chance and sent one truck-load to town. It seems, however, that his fame had spread for the quality and taste of his vegetables. Before the truck reached town, buyers stopped it on the road and purchased the entire lot at good prices. The empty truck proceeded on to the depot where without cost, it loaded up on cabbages which other farmers couldn't dispose of. These, ironically, were brought back and composted. Captain Wilson sold his entire crop at a nice profit, and every truck returned with a nice load of refuse cabbages for the compost heaps. Evidently, organically raised vegetables *do* taste better. There are dozens of other citations that could develop this point further, especially cases where animals when given a choice of grazing two fields, one of which is organically treated and the other chemicalized, will invariably graze the organic field down first.

Finally like a smug judge *and* jury, combined, Laurie states, "Thus to answer the title question—What is wrong with commercial fertilizers?—Nothing."

J. I. RODALE.

We will be at the New York Flower Show

FROM MARCH 18-23, Organic Gardening will have its booth at the Grand Central Palace, 44th Street at Lexington Avenue — Booth 103 on the second floor. We will not display any flowers or vegetables, but models of compost boxes and Organic Gardening Literature. Our Compost Authority, Oliver Lawrence, will be present during the entire exhibit. You will see all of our literature on compost and organic gardening.

Compost Is Inevitable

By SIR ALBERT HOWARD, C.I.E., M.A.

IN the South African *Farmer's Weekly* of September 13th 1944 an article by the late Mr. D. J. Hamman appeared describing the progress that has been made in the last eight years at the Estcourt Pasture Research Station under the charge of Mr. J. D. Scott. This research institute has been giving special attention to grass restoration and veld management. Such questions as whether the old veld grass should be burnt off or not, the best time of the year for mowing, and the effect of not removing the old grass at all have been under investigation.

Briefly the conclusions reached were that the old growth must be removed if pastures were to keep their quality, but that to burn the veld was harmful. It remained, therefore, to mow the old grass which thus provided valuable material for compost making.

Now that the agriculturists of South Africa have become compost-minded, it seems they are realizing more and more that the answer to many, if not most, farming and gardening problems is to be found in the compost heap. Compost truly is inevitable. The farmers and research workers of the Union, moreover, are learning for themselves that compost, far from being merely a desirable but too expensive medicine for the land, is actually an economical necessity.

'Compost,' says Mr. Hamman, 'can be costly to produce, but if dovetailed into the general farming system can become an inexpensive by-product. A method has been evolved at Estcourt to fit in with the farming system and to reduce cost to a minimum. By cutting the old grass on the veld at the end of the winter, instead of burning it off, all the bedding required for the stockyards or kraals during the winter-feeding period can be assembled and held over for the next winter. The stock in this area cannot subsist on the veld during the winter months, and are fed hay from the veld in central yards or kraals.

'Every week more bedding is thrown into the kraals. This catches up dung and urine, and by the end of winter a layer of mixed dung, urine, and straw has been built up to a depth of two feet. In spring, when the cattle return to the veld, this mixture is left on the floors of the kraals until it has been thoroughly soaked by the rains.

'It is then removed by means of a dam-scraper with prongs, two oxen, a driver and a leader being used to dump the material beside low platforms made of wattle thinnings. Two Natives then throw the material on to the platforms, which are about 18 feet wide and 25 feet long, until it is piled up 5 feet above the ground or 4 feet on the platform. Within three months this material decomposes into good compost, suitable for use on the lands without any further treatment.'

The Estcourt Pasture Research Station is only at the beginning of its good work. A fine start has been made on the right lines. The effect of this welding of compost manufacture into the routine of the pasture research work will be cumulative. Compost will provide better pastures and increased stock-carrying capacity (which in turn means more and better compost), and healthier animals will follow. The Estcourt Station has begun to lay well and truly the only possible foundation for future research work of real and lasting value—100 per cent fertility in the soil by means of freshly prepared humus.

SILT TRAP Fennell

Irish College Boys

IN his recent lecture on our inheritance, Sir Albert Howard referred to the College of St. Columba near Dublin, Ireland. From the official school photographer Charles C. Fennell of Rathgar, Dublin, we have secured pictures which show the boys at work on the school farm.

The farm is on a mountain side and silt traps are constructed on the stream to collect the silt for the compost heap and to prevent erosion.

When the school farm was started, there were many fields which had not been farmed effectively. Some land borders the mountains and had, in time, become overgrown with weeds and weedy shrubs, especially gorse. Such a field, seven hundred feet above sea level, looking out over the central plain of Ireland is shown in the second picture at the time of the fourth potato harvest. The boys not only look vigorous and healthy but also seem to enjoy their work.

The third picture shows the boys at planting time. Notice the planting of uncut seed and the crumbliness of the soil, but look also at the beautiful silhouettes of trees in the background. The only thing I should do differently is this—I'd take my wrist watch off. But boys are boys and—probably enjoy this work more than doing problems in calculus.

Now what does St. Columba's College stand for in agriculture? We find the information in a letter by Arch-

bishop Dublin and five other gentlemen. It was published in the London Times two years ago on February 28, 1944 and was previously printed in our magazine (June 1944). Since this number is out of print and no longer available, we take the gist out of the letter for the benefit of new readers. And the old readers will enjoy re-reading it because it is applicable even more today than it was then. While the compost school has gained much ground, while many scientific confirmations have turned up supporting our position, there still is not a sufficient public awareness to the importance of the question. Perhaps *our* readers should write such letters to the Editors of their papers, to their Congressmen and Senators, so that we can act before we get into the sad plight that already confronts other nations.

"Though our islands are not turning into deserts, there is a serious and progressive loss of fertility and a corresponding increase in disease among the plants and animals which provide our food. The majority of our city dwellers are unaware that the earth on which they depend for life is being slowly but surely done to death. But the comparatively few who study the problem tell us that the way to a healthy soil, which in turn will give us healthy plants and animals, is not by artificial means but by the return of all natural organic waste to the land.

Surely this is now an urgent and vital problem? Have we not an obvious duty to perform? In the reorganization of education we humbly submit that some provision should be made for the practical teaching of agriculture, arboriculture and horticulture on a wide scale in many of the schools, which have the good fortune to be situated in country districts, so that boys and girls, who will not necessarily become farmers, may have

POTATO HARVEST — Fennell

some knowledge and appreciation of this all-important problem. Agricultural education should not be left to the specialist students in colleges given over to that purpose, but should have a far wider circulation.

May we quote from our own experience as Fellows of the College of St. Columba? This college, one of the smallest public schools, recently acquired some long-neglected land, and with its own small property established a profitable mixed farm. It is worked by a committee of masters, boys and workmen. Much of the work is done by the boys, working with carefully selected men, none of it during class hours. The greater part of it is practical manual work in the open air. Once a week boys voluntarily attend agricultural lectures in the biology laboratory.

All farm, garden, and house waste of an organic nature is turned into compost. Over 100 tons was made last year. The soil is continuously being enriched, while drainage, weeding, animal husbandry, and tree planting are methodically carried out. Not only is the school provided with fresh vegetables, milk, beef, mutton, and wheat, but the general health is noticeably better with a greater immunity from infectious disease. Also, the standard of work, judged by public examination, is improved. We should mention that all surplus farm produce in the holiday periods finds a ready local market. The College of St. Columba has no reason to regret the experiment."

POTATOES Fennell

What Kinds of Seeds Should I Buy?

By HEINRICH MEYER

EVERY experienced gardener has gradually developed a system of selection. He has found out which varieties do best on his ground and under his conditions of light, warmth, and rain, and especially which varieties find the best welcome when they appear on the family table. But even he will be inclined to order more than he needs when he reads the new catalogues. Is there anything wrong with it?

I have never yet used up half of the seed packets I order. And roughly speaking, I could have saved four or five dollars every year by limiting my orders. But I would have lost fifty dollars' worth of experience and an immeasurable amount of fun. I might never have found out which lettuce beats all the others as far as our family is concerned. And since we eat lettuce once a day when the season is on, this selection makes some difference. A few dollars more, spent on seed, will, in the end, bring returns in actual value: You can get the best only if you find out about everything. And when you think how many dollars go to movies and other passing entertainments, why shouldn't you enjoy experimenting with different varieties?

Few of us will plant blackeyed peas, but the example is handy right now since the Texas Experiment Station just published a pamphlet about cowpea varieties. They grew about twenty different strains and varieties of the blackeyed peas, obtained from nine different seed firms, under the same conditions for two consecutive years. When measuring the yields, it turned out that one variety had yielded 420 pounds per acre, another one 4692. More than ten times the amount. Nor was this in the name. One variety from one firm was second best producer, the same variety from a different firm was second lowest. In other words, not the variety showed up, but the strain.

You may order the same variety of cabbage or lettuce from two different seed houses, but the result may be entirely different. They may have raised their seeds on different soils in different climates, and this difference will show up in your case. With the large national firms, it is therefore common practice to grow seeds in various parts of the country so that customers in all parts of the land can be satisfied.

What seeds should you buy? The new catalogues show, for example, new hybrid cucumbers and tomatoes. They cost more than the old kinds, but years of breeding went into their production. They may not suit you, but they must have suited the producers. Otherwise they would not have picked them. One hybrid tomato is reported to yield twenty per cent more than the best known yielders before. If your space is limited, that may allow you to grow more flowers, since you can raise six tomatoes where you formerly had only five. But right now, you want to look into the cabbages, lettuces, radishes, carrots, etc.

I advise only two things, give a trial to the rooted parsley. I am sure you will love it throughout winter, when you can add it to pot roasts and vegetable soups, freshly made. And give a trial to the Butterhead lettuce variety. As a health-conscious gardener, you know that the green part matters. The butterhead varieties have tender, juicy green leaves, buttery in taste, not the firm heads of the Ice-

berg kind. Now, here I have made my selection. I always order Early May King and Big Boston lettuce and skip the crisp-headed kind entirely. This may not be suited to your conditions, you may have to grow a crisp-head, let's say, Imperial or New York or Cosberg, or it may be so warm that you fare best with the loosely formed Slobolt, but for early sowing and early tender salads, see if you cannot get one of the butterheads to succeed.

As to radishes, try one of the Summer radishes too. I have found that the ordinary winter radishes are even preferable for summer growing, especially if the summers are not too hot. But since you cannot know beforehand how the weather is going to turn out, put out a row of White Strassburg, a summer radish, and a row of White Chinese or Long Black Spanish, besides the usual round red radishes, such as Giant Globe, Scarlet Globe, etc. A packet of these cost usually no more than ten cents and three or four varieties will give you a lot of seeds to play with and to experiment on, especially since radishes can be grown so easily on the slopes of the beds, between the young lettuce or cabbage plants, etc. When the radishes are pulled, the lettuces are ready to take over, and when they are out, the red cabbages take over. The early green cabbages may be a little too fast, so you had best not plant them between Slobolts, but between May King lettuce.

A packet of parsnip yields more than the average family will want through the winter, but a packet of salsify may just be enough. If you have never eaten it, we recommend it, and a recipe on how to prepare it will be published before the year is over. Then you want to try leek, which you can store over next winter, to have a fresh delicious vegetable, superior to onion in taste and agreeableness. If you like bread and butter with chives sprinkled on, now's the time to order. Be sure to find a space that is a bit shaded and moist and sow them very thickly. A packet should go into the space of a man's handkerchief. Then it is easy to cut. If you expect visitors or like cold meals with sandwiches, you had better order two or three packets. They must be sown early and will then succeed well.

When we come to flowers, I had best not give any advice. But when we order, we always try a few new ones. I don't, as a rule, go very strongly for double flowers, but I want to see what the double California Poppy (Eschscholtzia) looks like. But there are so many things I want to see. Before it's all over, I shall have ordered twice as much as I need. But what of it? If I don't sow every packet completely, if I sow a greater variety, I can always strew some left-over seeds along the edge of the fields, to see what becomes of them. Last year, my hedgerow was seamed with giant zinnias. And it was a nice sight as I walked home from the office. The first welcome in the evening was from my flowers. I have never regretted ordering seeds and bulbs. I am sure no garden lover ever has.

Humus, Humus Everywhere

RASPBERRIES, described in *Circular* 153 of the New York Station at Geneva, N. Y., are not different from most other crops, except that they are among the most profitable crops requiring the best land. "The ideal soil is a fine deep sandy loam, well supplied with humus and retentive of moisture, but well drained, although raspberries may do well on lighter and heavier soil," say the experts. Other directions will be found in the catalogues of the nurseries.

Dust From Afar

An excerpt from Dr. Pfeiffer's Bio-Dynamic Farming and Gardening (pp. 20-24)

"Contributions to the farmer's soil come from a distance in the form of dust. There are many natural sources of dust. One of these is volcanic eruptions. The famous eruption of Krakatao ejected dust into the air that traveled around the earth for several years as clouds, and could, even 30 years later, be detected in the atmosphere. The ashes of Vesuvius which buried Pompeii to a depth of several feet are a classic example. They produced an especially fertile soil. Fine ash from that eruption was carried as far as Asia Minor. Quite recently a volcanic eruption in South America emitted ash which, perceptibly darkening the atmosphere, reached even as far as Europe. It has been calculated that the fine, invisible dust reaching Europe from the Sahara amounts in a hundred years to a layer 5 mm. thick. In the Middle Western States of America in the last hundred years, about one inch of soil has been blown from the western prairies to the Mississippi basin. Great dust storms recurring annually deposited in the basin 850 million tons of dust per year from a distance of over 1250 miles, even before the recent disastrous dust storms.

The famous Sahara dust storm of February 1901, which affected an area of about 170,000 sq. miles brought to Europe about two million tons of material, and distributed 1,600,000 tons in Africa. A year later another from the Canary Islands brought about ten million tons to England and Western Europe. Such dust is either brought down by rain or in passing it adheres to the moist ground and vegetation. In China the wind-blown deposits reach a depth of several hundred feet. These deposits help produce very fertile soils. Curiously enough, the dust deposits of the American Middle West have a composition similar to loess (diluvial deposits of loam). Passarge states that the black earths of southern Russia are the best and most typical development of loess, for loess favors the development of steppe flora and, on account of its porous character, is easily impregnated with humus materials. (These facts are taken from S. Passarge *Die Wirkung des Windes. Handbuch der Bodenlehre.* Bd. 1, 1929. Berlin). It would seem that the black earths of Morocco are also a loess formation. According to Th. Fischer, southerly winds from the steppe lands west of the Atlas Mountains bring dust which is retained by the vegetation and precipitated especially by the very heavy dew at night. Dust deposits and decaying vegetation are thus the origin of the extremely fertile black earths.

With a content of from 25 to 34 per cent organic matter and a remarkably high potash content of from 1 to 4 per cent and even 6.9 per cent in volcanic ash, these deposits from the atmosphere are a well balanced fertilizer. Volcanic ash is the cause of the fertility of the plantation lands of Central America and the East Indies. The Chinese peasant welcomes dust-laden winds in the Yangtze basin as bringers of fertility. So did the farmer in the prairies and South African veldt until the catastrophes of recent years. Pointing out the importance of the quality of atmospheric dust deposited annually, Dr. Treitz sums up his conclusions by saying:

(1) Dust deposits restore the exhausted bases and soluble salts (cal-

cium, iron, potassium, etc.) in the soil.

(2) Inoculating substances for stimulating life in the soil are carried in the atmospheric dust.

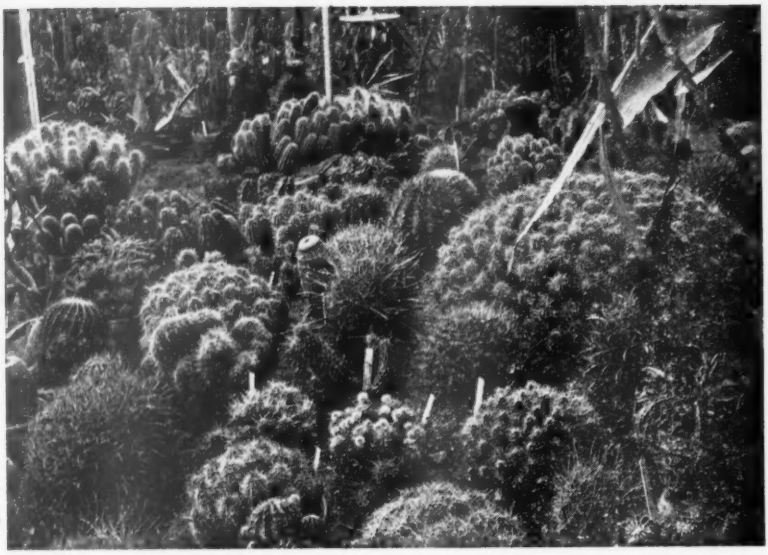
Braun, Blanquet and Jenny have shown that the soil of Alpine meadows is largely formed by dust particles from the neighboring mountains; deposits of 2.8 to 3.7 pounds per sq. yd. per year were measured. Discussing the nature of peat ash, which besides a considerable water content also contains mineral ingredients—especially argillaceous sand, magnesia, gypsum, oxide of iron, in addition to some alkalis, phosphoric acid and chlorine—the same authorities state that at least a part of these substances could have been brought into the pure peat-moss only by the agency of wind. The quantity is not inconsiderable since dry peat-moss contains an average of 10 per cent mineral substance.

Additional fertilizing substances are also present in the rain-water received by the earth. For example, rain-water contains the important fertilizing element carbonic acid, of which over a million tons fall yearly in rain-water in Germany alone. On the sea coast there are the salts brought by wind and rain. Then small but active quantities of iodine—0.1 to 0.2 cubic mm.—are present in the air. There is also chlorine. Along the English coast, one quart of rain-water carries at least 55 milligrams of chlorine and even in the interiors 2.2 milligrams are deposited. During storms in Holland, 350 to 500 milligrams per litre of rain-water were measured. This means that we have in these regions a chloride fertilizing from the air ranging from 1 to 13 pounds per acre. In many tropical regions such as Ceylon this figure rises to 30, to 50, or even 150 pounds per acre due to the strong evaporation of the sea-water.

It is also surprising to find that other substances important to plant nutrition are present in measurable quantities in rain-water. There is a particular relationship between nitric acid together with other nitrogen compounds and rain, and between phosphoric acid and snow. This is not without importance for the practical agriculturist. In his desire to conserve the nutrients in the soil and to set free those bound up in it, he often resorts to one-sided chemical fertilizing, not realizing what assistance Nature offers of her own accord. Nitrogenous compounds rain down on England for instance at the rate of 3½ pounds per acre, and in northern France 9 pounds per acre per year. Measurements of sulphuric acid yielded the following figures per acre: in Giessen, 8 to 100 pounds; in Cologne, 200 to 340 pounds; in Duisburg, 200 to 600 pounds per year—unquestionably a considerable fertilization.

One more source of material from the atmosphere should be mentioned and that is the so-called cosmic dust and meteorites. A significant quantity of such cosmic substances reaches the earth throughout the year. A continual change of substance takes place between the earth and cosmic space. In the case of meteors the masses are concretely perceptible since individual specimens often weigh many tons. And to this must be added the shattered dustlike particles of shooting stars. The quantity of this cosmic dust varies between 10,000 and 1,000,000 tons per year. It even causes the formation of certain red deep-sea sediments.

The mention of these facts is not intended to imply that everything needed by the farmer comes from the air and that therefore manuring is unimportant. *Good manuring is always the basis of all agriculture.* These facts are only cited to point out that there are often active factors in addition to those involved in the nutrition equation. There are more processes interacting between soil and plant in Nature than in a test tube. An extension of our knowledge in this direction is a vital necessity. We should learn to understand and be able to reckon with the biological processes in Nature."



CACTUS COLLECTION N. Y. Botanical Garden

Cactus Growing North and South

By HEINRICH MEYER

I HAVE often wondered why the cactus growers all over the world are friendly people who like each other. This fraternity is not internationally organized, and few of the people who enjoy the magnificent blossoms of the various cacti belong even to national organizations. But let two cactus lovers get together! There is immediately an exchange of opinions and, in due time, an exchange of cuttings. Just read one of the magazines, for example, the *Cactus and Succulent Journal,* published by the Cactus and Succulent Society of America, Inc. in Pasadena, Cal., and you will see the friendly spirit of the lovers of those spiny plants.

I grew up among cacti which my father used to grow, to graft, to hybridize, and to give away. So I am naturally well aware of the problems involved in cactus raising. As a rule, the cactus lovers also grow other succulent plants, such as occur among the euphorbias and in other plant families. One group, the Stapelia genus with its tigery flowers that have such an unusual odor that the plants are called carrion-flowers, is particularly well liked. We will discuss succulents like these at a different time and restrict ourselves now to cacti proper.

Not all spiny plants are cacti, of course, and a good many dagger plants, such as the *Agave,* which are usually sold by dealers in cacti, belong to entirely different plant families. *Agave,* for instance, is a relative of Amaryllis. But when you know

what a beautiful flower an Amaryllis is, one of the most magnificent in creation, you will always think: There are flowers of equal magnificence and splendor, flowers of a sort that are otherwise only found among the bulbous plants, such as lily and amaryllis, constantly surprising by their size and the marvels of color blends, and these flowers are among the cacti. Those who are not acquainted with the beauty of a *Phyllocactus,* now and in this country usually called *hybrid Epiphyllum* or Orchid Cactus, have missed one of the greatest delights that gardening can offer.

So many people see cacti in small or even tiny spots, brownish green, with a bunch of spines, a bit dusty and rather quaint, but not exactly overpowering behind a florist's window. To them it must look as if growing beautifully flowering cacti would be a forbidding task, since they only get to see these rather insignificant specimens, occasionally with a few not too exciting buds in yellow or creamish white. Their price is high, which adds to the confusion: "A thing that cost so much must be hard to grow. It is probably something I could not undertake. And if I did, what would it mean to me? I can think of more attractive flowers and plants." I should say at the outset that all of this is wrong. It is especially wrong for the city dweller who has little space for flowers. If he has a sunny window, if he has any window at all and a room which does not freeze tight in winter, he can grow cacti that will bring him more flowers and greater rewards than any other potted plant with the exception of tuberous begonias and flowering bulbs. The latter are a bit quicker of growth, but they are also more limited in possibilities. You cannot breed them on the window sill, but you can breed your own cacti and get beautiful flowers without waiting for decades. You will, *if you know* what cacti to grow.

Let's first see what kind of cacti exist! Everybody who has driven through the Southwest has come across numerous cactus varieties in the desert. He may have seen gigan-

ECHINOCEREUS ENNEACANTHUS N. Y. Botanical Garden

CARNEGIA GIGANTEA
N. Y. Botanical Garden

tic cactus trees, or clusters of spiny hedgehogs nestling close to the ground, broad bundles of prickly pear cactus, whose stems look like leaves. If he saw them at blooming time, he may have enjoyed their well-shaped flowers, but he may not have realized that these dry-land cacti are just one group, that in addition there are cacti with leaves and cacti without spines, cacti growing in luscious tropical jungles and trailing cacti of many shapes, that might have more startling attractions.

I do not like to praise one plant at the expense of another. I like them all, and I would not even praise the most beautiful cactus flower for fear that I might offend against the rose, the carnation, the salpiglossis, and many others which have their beauties and need not be compared and graded, but can be enjoyed severally and together. I can appreciate the beauty of the desert cactus and I shall sometime write about its marvellous powers of adaptation: Think of a leafy plant throwing off all leaves and becoming a living trunk that can get along without rain for years. Imagine a human being changing into an accordion and keeping going! But I think the majority of the desert cacti should not be first choice for the Northern indoor gardener, because they need too much time or space to produce flowers. In pots, these flowers are not sufficiently rewarding for anyone but the collector or the Southerner who need not worry about severe freezes.

I should say, in this connection, that cactus fanciers have one thing in common with book lovers. They will always get more, they will always increase their collection, they enjoy having different species and varieties, and often they do not even ask for anything more than a rich collection. This attitude is frequent among cactus lovers, but it is like all possessive habits inborn, not acquired. If you are not the collector type, you may not derive enough satisfaction from having a window studded with two hundred tiny pots. I personally do not have the collector's instinct as regards cacti and shall therefore not make so many recommendations as the "true" cactus lover might wish. I am satisfied now if I can get "new" cactus lovers.

To begin with, all cacti are, as far as is known, of American origin. They are natives of the Western hemisphere and do not occur in the wild elsewhere in the world, though *other* succulents, that is, juicy-looking plants, have developed under dryland conditions in Africa and Asia. But is a cactus a dry-land plant?

Definitely not, and we call attention to a letter in Questions and Answers in this issue. Like all plants, cacti depend on food-intake through roots, which means, they depend on rainfall or soil moisture before they can grow at all. The fact that they get along with little moisture is an acquired characteristic. Just the same, it is so ingrained in *some* cacti that they now cannot stand too much moisture unless this moisture drains away. The same plant which you can water profusely, as it grows in the open in Texas or California, a plant that may naturally grow right close to the Gulf coast with its plentiful

rains, would rot away if it were given great amounts of water in the North. First, it is in a pot inside and the limited amount of earth sours easily. Second, it has limited amounts of sun intensity and could therefore not make a quick growth for which ample soil nutriments would be required. You cannot grow a desert cactus quickly and healthily inside, but you can put it out in the open during the warmer months and it will benefit. If grown in the garden, you need, indeed, not worry about watering, provided light and sun conditions are such that the cactus can make a good growth. If you underwater, you will not get rot, but shrivelling. It seems easy enough for an intelligent and watchful person to hold the proper middle between rot and shrivelling. This middle course does, however, depend on light and temperature conditions; the rules that are perfect for California would fail in Pennsylvania.

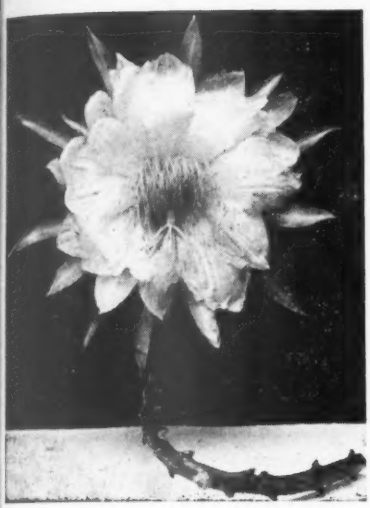
Let us now look at some cactus species and see what we can do with them.

There is one cactus, pedantically called *Pereskia,* but named after a wealthy French nobleman of the seventeenth century, called Peiresc, and therefore also listed as *Peirescia.* This cactus looks like, well, let's roughly say, Smilax. The cactus shows its leaves clearly, and the plant looks in general no more like a cactus than a barberry bush. It is a native of the American tropics, the original form of most cacti, and the quickest growing of them all. It is the natural understock for grafting slower-growing species and thus one of the most important cacti to one who loves the *epiphyllums.* These, also native to the tropics, are flat-stemmed, leafy in appearance, and invariably abounding in magnificent flowers. Their flat stems can be readily inserted in a *Peirescia* stem of proper size, which will enhance good and speedy blooming, and allow the more trailing epiphyllums to hang downward. The beginner will do well in getting a few *Peirescias* so that, by the time when he no longer is a beginner, he can go into propagating his most cherished epiphyllums.

Among the epiphyllum genus, there are a good many sturdy plants, those *phyllocacti* already referred to, which have glorious flowers in beautiful colors. These can be easily propagated by stem cuttings, they only need some warmth and moisture to send forth roots. Under average conditions, it is not practical to graft the triangular or flat stems of the *phyllocacti.* They can very well get along on their own roots, but need support by stakes. The soil for them should be a humus rich in organic matter, whereas the hot land cacti need a more clayey soil with greater amounts of lime.

Common with these leafy-looking cacti, whose beauty appears mainly at flowering time, the *zygocacti* produce beautiful flowers and require similar treatment; for a long time they were called *epiphyllum* too, which was not so bad, because they differ from the other *epiphyllums* only by the number of their stems. They are from the Southern hemisphere and therefore winter bloomers in our regions, very beautiful indeed.

Now there is a number of tropical cacti, called snake cactus, belonging to different genera, but being all related to the candelabra cactus of our desert, the cereus group. *Cereus serpentinus,* the snake cereus, now called *Nyctocereus serpentinus,* is usually night-blooming, so is the Night-blooming cereus, now called *Hylocereus,* while the *Selenicereus,* moon cereus, forms a third group of night bloomers. All of these need rich garden soil that keeps the moisture well, all of them are climbing or trailing or, at least spreading, all of them are magnificent bloomers. And none of them will disappoint a flower lover. None of them need any particular care except the warmth of a room in the colder months and provision for moisture in the air. A common spray-gun can be used to spray water among them. But gas fumes will harm



SELENICEREUS HAMATUS
N. Y. Botanical Garden

all of them. If they do not bloom, repot them in better earth and they will grow better; when they have reached a certain size they will get ready for reproduction and flower. I can see no merit in the practice of forcing them to flower by stunting them in small pots. Why should these lovely beings be forced to rush into blossoms from fear of starvation? As they outgrow their pots, put them in the next size, prick off some of the roots and give them fresh soil with some hoof and horn meal and good old compost or leaf mold; they will bloom again, only more beautifully and profusely.

The various spiny cacti, commonly seen in small specimens in the show windows catering to collectors, are of different merits when it comes to flowering. The Old-Man cactus, *Pilocereus senilis,* now called *cephalocereus senilis,* forms the transition from the erect cereus or candle cacti, easily recognized by their ribs, to the barrel or globe-shaped rounded cacti, *Echinopsis, Echinocereus, Echinocactus,* and *Mammilaria.* Their blossoming propensities vary, but the most showy flowers are found here among the *Echinocerei* and *Echinopsis.* They remain usually small, while the *Echinocacti,* which have woolly growths as a characteristic sign of distinction, often attain considerable size of stem, but only relatively small flowers. The *Mammilaria* genus is, to my mind, one of the noblest and most interesting for various reasons. The flowers are usually quite exciting, not considerable in size, but quite attractive, the plants themselves are varied in shape and coloring of spines. It is the most difficult and slow growing of these bloomers, but at the same time so prodigious or even wasteful when blooming that we can hardly estimate its background. How would a slow-growing cactus, adapted to drought in the most efficient way, become such a spendthrift when blooming time comes?

There are yet many other cacti, whole groups and genera, varying in many respects, some with rather good flowering propensities, such as we see among the *Opuntiae,* the Prickly Pear, but none of these equal the ones already mentioned in suitability for inside growing and at the same time rewarding blooms. All of the spiny cacti mentioned in the last paragraph should be carefully watered. They must be watched for parasites, especially a few mites and insects with white and red velvety or woolly covering and for aphids. When you grow them in the South or temperate West, you can give them the benefit of the open air and even of the open land; in the East and North, you had best place them outside a sunny window if you can get boxes there, or otherwise in sunny locations. But remember your own sunburns on the first bathing days. Plants that were kept inside under sheltered winter conditions must be given time to take again the sun's rays to which they were accustomed the year before.

The tropical cacti are all lovers of rich soil and moist air, but they are not exacting; the spiny cacti which once developed an adaptation to dry climates are now less adaptable and must not be over-watered. The

Opuntiae or Prickly Pears are the most casual among them, the ragamuffins in the cactus world. They take what they can get and manage to get along under mistreatment, but the aristocratic *Mammilaria* group wants care. The *Echinocactus* is not equally demanding. But some of the difficult ones can be hardened by grafting and thus getting the benefit of more adaptable cereus relations for understock. When you come to this stage you will no longer need my advice. But in order to get there, try some simple easy ones now. They are simple only as far as care goes, but beautiful when they flower, and in that respect more rewarding than some of the charges of the ambitious collector.

A list of species with beautiful flowers:

Epiphyllum ackermannii
Epiphyllum crenatum
Zygocactus truncatus
Aporocactus flagelliformis
Heliocereus speciosus
Echinocereus blanckii
Echinocereus pentalophus
Echinocereus knippelianus
Chamaecereus silvestrii
Echinopsis multiplex
Echinopsis eyriesii
Echinopsis tubiflora
Gymnocalycium platense
Thelocactus bicolor
Malacocarpus haselbergii
Mammilaria camptotricha
Selenicereus grandiflorus
Echinopsis aurea
Opuntia bonaerensis

A useful book: *Cacti for the Amateur* by Scott E. Haselton, Cactus and Succulent Society of America, Box 101, Pasadena, California.

Raising Cacti From Seed

LOOKING OVER the catalogues of our advertisers, we find that you can order a great variety of cactus seeds from them. This is a wonderful opportunity that several years ago would have not existed. You can now buy collected seeds of different varieties or even assorted hybrid phyllocacti and raise flowering plants in your window garden. This exciting enterprise requires only proper growing conditions: Fill a flat with earth, sprinkle over it about one fourth of an inch crumbled sphagnum moss, obtainable from your seedsman, wet the material down and keep it moist. The seeds will germinate in the moss and find their way down to the soil without damping off. Just be sure that the moss not only looks wet, but is wet. For one dollar's worth of seed, you can raise thirty dollars worth of plants and a thousand dollars worth of fun.

Interesting Letters Department

AN ANONYMOUS CHEMIST

Dear Mr. Rodale:

That plants grown with compost are more resistant to disease than those grown with chemical fertilizers is no longer a theory but a proved fact. A scientific explanation of this fact is, however, still lacking. We say that the plants are "healthier" and therefore more resistant, but that is merely restating the case in slightly different words. Recent work which has been done on the extraction of anti-biotics from soil organisms offers a possible explanation.

Perhaps you have read an article which appeared in the Saturday Evening Post for December 8, entitled New Medicines from your Backyard. This was a popular account of the work done by Dr. Waksman and other investigators. I enclose a cutting from a recent issue of The Indicator, covering the same subject. Both these articles report the extraction, from soil organisms, of anti-biotics of extraordinary potency. They have been used with almost miraculous results in curing various human diseases.

While I do not find in either article any statement to the effect that such organisms grow more vigorously in soil containing much organic matter, it seems certain that such must be the case. Is it not logical to suppose that plants in some way make use of these organisms in combating diseases to which they are subject? They may even have the power of absorbing into their sap the active principles which destroy disease germs. If so, we have a scientific explanation of the value of organic gardening. It is, in a sense, an extension of the theory of the mycorrhizal association of which Sir Albert Howard writes in An Agricultural Testament. Possibly Sir Albert would be interested in having this suggestion drawn to his attention. Possibly, the same theory has already occurred to you or to him.

In conclusion, may I congratulate you on the fine reception your book, Pay Dirt, has received. I have now read three reviews of it, all favorable. I hope it has a large sale.

(Name withheld by request.)

—o—

RESULTS—of an Earthworm nature

Dear Organic Gardening:

The other day it was warm, more like Spring than January. I went out to the garden to look at the soil. I had a stick in my hand and, while poking around with it, happened to lift a spot of the compost which I had spread last fall. In doing this I uncovered an earthworm. Earthworms have been the exception rather than the rule in my garden, so I was surprised. Continuing on, I found that wherever there lay an amount of compost on the surface of the soil there would be earthworms under it or in short distance of it. As this portion of garden soil was newer than the rest, I looked over the older parts. These had a rye and vetch cover, just showing green, but no compost. The soil, for some eight years past, had been treated with lime and chemical fertilizer—mostly super-phosphate. I was either unlucky in selecting spots to dig for worms or else there were none,

for I made an honest and unbiased search for them. On the other hand, there were plenty of earthworms in a piece of this same older soil which had been uncultivated for the last four years. I had planted strawberries, mulching heavily with forest leaves and straw, the berries having straggled out and the mulch disappeared. I wondered if I might find worms on the site of one of the used up compost piles and, suiting action to the thought, went over to look. Some probing about in the fine layer of residues brought to surface some very young and very pink worms. This seemed to be an earthworm nursery. Not far away were the telltale ridges made by a mole. From here, I walked out to the woods where the soil of the forest floor was thickly covered with last year's leaves. I poked about and, finally, chose a spot where there was a slight depression. First there was the four to six inch layer of this year's leaves, then the grayed remnants—half to one inch—of other years, a skin of forest humus and, last of all, the yellowed soil. It was between the humus layer and the soil that I found my earthworm. It was encouraging to find that such fastidious creatures could appreciate my compost as much as the real thing. More than this—I thought if earthworms are any augury for the future of a garden, the intestines of the soil Organics' calls them, then the future looks bright.

Bingham Small,
Charleston, W. Va.

—o—

ASHES

Dear Mr. Rodale:

In confirmation of what you say concerning paper in a compost heap, in your good book "Pay Dirt" you might be interested in my experience with ashes from my incinerator.

I had three fine healthy apricot trees, ten years old, in my family-orchard. I had about a shovelful of ashes in the bottom of my incinerator where I burned all my rubbish, mostly paper (this was before the war).

I scattered most of this shovelful of mixed ashes under the first tree, in the row.

I scattered the remainder, about a handful, of the ashes, under the second tree in the row. The third tree got none.

After the next monthly (overhead) irrigation I noticed that the first tree looked acutely sick, its leaves wilted, and in a few days turned yellow and dropped off.

The second tree showed a little wilting and a few leaves dropped. About that time I read that paper ashes are poisoned with the bleachers and other chemicals used in the process of paper-making.

So I immediately scraped all of the ashes from under the two trees. For the first tree it was too late. The damage was done. It was as dead as a wooden Indian.

The second tree finally recovered. The third tree has been healthy at all times.

Very cordially yours,

Walter Rittenhouse,
San Diego, Cal.

—o—

CHAMPION COMPOSTER

Dear Mr. Rodale:

In my neighborhood I am the champion Composter. Like King Agrippa before whom Paul was making his defense, and who said "Almost thou persuadest me to be a Christian," I am almost persuaded to practice my profession on my two lots next to my home, teaching that health starts in the soil and pills, etc. are but relievers of misery and do not basically solve the problem of health.

I do considerable lecturing and have given two or three talks on organic gardening. Also I write short articles and am being a good missionary by teaching organic gardening upon occasion. You may like to read over the

enclosed article which I clipped from one of the papers.

I was interested in your theory that lice and bugs do not attack healthy plants. Few medical men, I believe, think that germs actually cause disease, but rather that when the body's resistance is low germs attack us. I never realized such might be the case with vegetables. After being apprized of this in Organic Gardening, I planted two spots of 12 cabbage plants each, treating one patch according to our modern poison method and the other according to the jungle chemistry (compost) method. Of the twelve with modern treatment all became green with lice, eight of which I sprayed with poisons, four of which I did not spray. The unsprayed four died, the sprayed eight finally made good-looking cabbages, unless you beamed your eye on the twelve grown in compost according to your booklet on "How to make Compost." Man what a difference! Those twelve seemed to struggle to get out and see the world. They kept their heads ever on the stretch. And we simply couldn't stomach the modernistic cabbages.

On my two lots I have spread over forty yards of compost which I have made myself, and maybe by next spring I'll be showing off my organic garden to some of my classes. It so happens that in my medical practice I use mostly natural herbs, which of course are jungle grown. I have observed better results by brewing natural herbs than by using the medicinal extracts thereof, and am convinced that the better results are due to the yield of natural vitamins and minerals along with the medicinal qualities. Anyway I am doing my best to get all of my patients not only to change from gardening with poisons to gardening with natural methods, but am advising those who are building homes to buy two lots and build half a house, and live in their own version of the Garden of Eden.

Yours very truly,

Louis L. Sherman,

Oakland, Cal.

Compost making at the Experimental farm. 6 inches of plant matter are spread. Photo by Cedric Morris.

Flea Beetles and the Gardener

By RICHARD HEADSTROM

MARCH. The month of blustery winds and of melting snows but also of returning bluebirds, robins and grackles, of pussywillows and skunk cabbage, of blooming maples and elms, of spring peepers calling from a nearby pond, of garter snakes sunning themselves on some stone wall, of spring azure butterflies flying lazily about like "violets afloat" in the still naked woods, of reawakening chipmunks searching for food—in short the month of returning spring.

It is the month, too, when your gardener turns his thoughts to seeds and hot beds, to fertilizers and soils, to early crops and late crops, in short to his garden and how this year he can best his arch enemies—the insects, the bane of any gardener's existence. Though not entitled to call myself a gardener I always have a garden of sorts and more than once I have thought how much fun there would be in raising things if it were not for those two ever present evils—weeds and insects. Of these two evils weeds, of course, is the lesser and the one more easily taken care of. But as for insects, there are so many different kinds and so many of each kind that sometimes it seems nothing short of a miracle that anything can grow. Consider the flea beetles alone, for instance. I do not know how many species of these insects there are (although I probably did know at one time) but some nineteen species attack our garden crops, including, I guess, every conceivable crop that we would be likely to raise—cabbage, turnip, radish, potato, sweet potato, bean, pea, pumpkin, eggplant, watermelon, melon, corn, wheat, oats, rye, sugar beet, beet, cucumber, squash and those that I have left out.

The flea beetles (also called jumping beetles) are small active insects which are able to jump vigorously when disturbed. If you want to know how these small creatures can jump so well examine their hind legs and you will find that the femora or thighs are greatly enlarged to accommodate the powerful extensor muscles which are used to propel them through the air. They never remain in one spot for very long but move about on the food plant, eating a little here and a little there, but never much at a time so that the leaves gradually become covered with very small, rounded or irregular holes and look as though they had been peppered with fine shot. If the beetles are abundant they may cause so much damage to the foliage that the plant can no longer carry on its life functions and dies, but if they are few in number the holes which they eat in the leaves might not unduly affect the plant except to provide an entrance for some plant disease. The beetles themselves, as a matter of fact, are often carriers of disease organisms and may thus transport them from one plant to another and spread them as they feed. As a case in point we might mention the potato flea beetle which spreads the early potato blight in this manner.

Most of the flea beetles, which have spent the winter as adults under leaves, grass or trash about the margins of fields, along ditch banks, fence rows, margins of woods and similar protected places, emerge from their hibernating quarters before the garden plants have appeared above the ground and feed meanwhile on weeds and the foliage of trees until the garden plants are avilable, when they migrate to them. Although some of these pests are general feeders most of them appear to attack only one plant or the closely related crops of a single plant family. About such plants

most of them spend the greater part of their life history. The eggs, which are so small as rarely to be seen by the average gardener, are usually scattered in the soil about the host plants although the striped cabbage flea beetle lays her eggs in tiny cavities gnawed in the stem of the plant, while the horse-radish flea beetle deposits her eggs in clusters on the leaf petioles and the sinuate striped flea beetle lays hers singly on the leaves of cabbage, turnip and radish. The larvae of the flea beetles are slender, delicate, cylindrical worms, measuring from 1/8 to 1/3 inch long when full grown, and are mostly whitish in color with tiny legs and brownish heads. In some species the larvae do almost as much damage to the host plant as the adults, either by feeding on the roots or underground stems, by mining in the leaves, by burrowing in the leaf petiole or by feeding exposed on the underside of the leaves.

One of the largest of the flea beetles is the spinach flea beetle Disonycha xanthomelaena. It measures from 1/5 to 1/4 of an inch long, perhaps not very big in comparison to other insects but big for a flea beetle. It is oval in outline with greenish-black wing covers, a yellow prothorax, and a dark head. Most gardeners are doubtless familiar with it as it occurs over the greater part of the country, from New England to Montana and southwest to the Gulf States, and is a common pest of beets and spinach. The adult beetles leave their hibernating quarters during April and May and at once proceed to lay their buff or orange eggs on end at the base of the host plants or on the soil nearby. The eggs hatch from sometime in April to early July, according to locality, and the dirty-gray to purplish larvae feed on the underside of the leaves. They keep together in families and migrate from leaf to leaf and when disturbed "play possum" and drop to the ground, a habit also characteristic of the adult beetles. The larvae have one aim in life—to eat and grow and according to how much they eat mature within two to four weeks. They are then 1/4 to 1/3 inch long and are very warty, each wart, moreover, terminating in a short black hair. When they are full grown and have fulfilled their larval destiny, the grubs descend to the ground and enter the earth to pupate. The pupal stage lasts a week or ten days and the new adults appear in July. These beetles in turn lay eggs over a two-month period and the grubs which hatch from these eggs transform into beetles before the winter sets in.

A flea beetle which is often a serious pest on potatoes is the potato flea beetle, Epitrix cucumeris. Those of you who are up on your Latin might wonder why it is not called the cucumber beetle since that is its specific name. To put your minds at ease I might add that the beetle has commonly been called the cucumber beetle but it is evidently a misnomer, since it is much more abundant on the potato and related plants. This is not to say that it doesn't attack cucumbers; it certainly does and a vast number of other plants as well, such as tomatoes, squashes, melons, beans, corn, radishes, turnips, beets and others but its favorite food, however, seems to be the potato.

The adult flea beetle is small like all the other flea beetles and measures but 1/16 to 1/12 of an inch long. It is jet black, with yellow legs and antennae, and near the hind margin of the prothorax is a transverse groove while the elytra, or wing covers, bear rows of tiny pits, characters which are certainly definitive enough to permit anyone to identify it. I think most of us are familiar with it for it is widely distributed from Maine to California and at times can be quite destructive as perhaps some of us have discovered although it seems to be more commonly injurious in the North.

The adult beetles spend the winter under leaves and rubbish and emerge from such places in April and May. As the potato plants are not yet up they feed meanwhile on plantain and

other weeds and on the foliage of apple, wild cherry and other trees until the potatoes begin to appear above the ground, to which they then migrate (perhaps about the first of June) and lay their eggs in cracks of the soil near the roots of the plants. After having laid their eggs, the beetles transfer their attention from the weeds and the foliage of the trees to the leaves of the young potato plants. They eat through the lower epidermis with the result that the upper epidermis over the cavities dries and falls out leaving holes in the leaves and producing the effect of the leaves having been peppered with fine shot. When the beetles are abundant the damage caused by them can be quite extensive. Meanwhile, the eggs hatch into white, slender and worm-like grubs with a dark brown head which at once proceed with their nefarious work of feeding on the roots and sometimes mining into the tubers causing "slivers" in the tissues of the tubers and "pimples" on the skin. The grubs eat and grow until they measure about 1/5 of an inch in length when they pupate for six to eight days in the earth. The beetles which emerge from the pupal cases are probably the ones that carry the species over through the winter for there appears to be only one generation a year, though a partial second one may occur in Iowa.

GRAPEVINE—Flea Beetle, adults and larvae on foliage.

A flea beetle that might easily be confused with the potato flea beetle

is the eggplant flea beetle, Epitrix fuscula. It is, however, somewhat larger with wing-covers more hairy and with the groove at the base of the throax not quite so distinct. It attacks somewhat the same food plants but is particularly abundant on eggplant and seems to be more commonly injurious in the South.

The sweet potato is also, like the white potato, subject to the ravages of a flea beetle, Chaetocnema confinis. The sweet potato flea beetle is about 1/16 of an inch long, bronze-black in color with antennae and legs reddish-yellow, and is widely distributed throughout the United States east of the Rocky Mountains. These beetles attack the sweet potato plants as soon as they are set out, eating characteristic channels out of both surfaces of the leaves and thus causing them to turn brown and wither away. If the beetles are abundant and the weather is particularly dry an entire plant may succumb from the damage thus inflicted.

In early June the beetles leave the sweet potatoes and migrate to bindweeds at the bases of which they lay their eggs. The eggs hatch into slender white grubs which feed on the roots and when mature pupate in the earth. The beetles which emerge from the pupal cases curiously enough do not attack the sweet potatoes at this time but prefer to feed on bindweed and the wild morning-glory on which they remain until mid-September when they disappear and go into hibernation.

A very common flea beetle east of the Rockies is the striped cabbage flea beetle, also called the turnip flea beetle. This pest attacks various cruciferous plants especially cabbage, turnip, radish and mustard, and although, as a rule, only troublesome sometimes appears in such numbers as to do serious injury. The beetle is 1/12 to 1/8 of an inch long, is shining black, and may easily be recognized by a longitudinal wavy yellowish stripe on each wing-cover. The adult beetles harm the plants by gnawing pits and holes in the leaves and the larvae by mining into the roots. The larvae sometimes do considerable damage, especially to radishes.

Cabbage plants are also attacked by two other flea beetles, the red-headed flea beetle, Systena frontalis, and the pale-striped flea beetle, Systena taeniata. Both of these insects are rather common pests east of the Rockies and also infest beans, beets, corn, and other crops. The red-headed flea beetle measures about 1/6 of an inch in length and is jet black with a reddish or reddish-yellow head, hence the name. They injure the plants by eating the leaves and riddling them with holes. In late July and also in August and September they lay elliptical, pale yellow eggs in the soil and which, unlike those of most other flea beetles, do not hatch until the following spring.

The pale-striped flea beetle is undoubtedly the worst pest of the two, sometimes appearing in late June and early July in such numbers that the young crops may nearly be ruined before it is brought under control. It is, moreover, an almost omnivorous feeder and may attack in addition to those mentioned other crops such as tomatoes, eggplant, carrots, melons and other cucurbs, turnips, strawberries, cotton, peanuts, oats, pear foliage, indeed, it will attack almost any crop at hand.

The beetle measures about 1/2 of an inch in length and is of a shining, reddish or brownish-yellow color. It may easily be recognized by the broad yellow stripe down the middle of each wing-cover. Injury to the host plant is in the form of holes or cavities eaten by the beetle in the lower sides of the leaves. The eggs, which are pale yellow in color and elliptical in form, are deposited usually singly from 1/2 to 3 inches in the soil and among the roots of the host plant. They hatch in from fifteen to twenty-three days and the whitish slender grubs feed on the roots and appear to spend the winter in the soil.

Grape growers are frequently troubled by numbers of little blue or

greenish beetles which appear in the spring and eat out or entirely consume the swollen grape buds. When abundant the beetles may destroy all the buds on the vine and thus greatly retard the leafing out or even kill the plant. The adult grapevine flea beetle, Altica chalybea, as it is called, is a dark, shining, steel-blue insect about 1/5 of an inch long, and is found from Massachusetts to Colorado and south to Florida and New Mexico.

The beetles appear in April or early May and after feeding a few days, the females begin to deposit their oval, yellow to orange eggs in cracks of the bark, under scales around the buds, and infrequently on the foliage. They hatch in about fifteen days, just as the young leaves are expanding, into dark brown grubs, which, when mature, turn to a dark yellowish-brown color and marked by regular rows of blackish spots or tubercles on the dorsal side each of which bears a small hair. The newly hatched grubs feed greedily on the expanding leaves, eating out irregular holes through the skin and into the soft tissue, and sometimes cause considerable injury. When full grown, the grubs drop to the ground and go into the soil from 1 to 2 inches and there each makes a smooth cell in which it changes to a pupa. The pupal stage lasts from seven to ten days and in one to four days more the adults emerge, feed for several weeks, and then go into hibernation, to reappear the following spring.

There are a number of other flea beetles but lack of space forbids any further discussion of them. Among the most destructive garden species, in addition to those already described, are the horse-radish flea beetle, Phyllotreta armoraciae, the sinuate-striped flea beetle, Phyllotreta zimmermanni, the tobacco flea beetle, Epitrix parvula, and the corn flea beetle, Chaetocnema pulicaria. Flea beetles are difficult to control but often the best method is to keep down weeds in and around the garden since the adults frequently feed on them in early spring and late fall, to say nothing of the larvae which may develop on the roots.

Rock Phosphate Tops Them All

THE DEPARTMENT of Agronomy at the University of Illinois sent out Professor DeTurk's list of fertilizers used in the state during the year 1944. The grand total of all commercial fertilizers, including 312 tons of bone meal, 1,712 tons of nitrate of soda, and other substances, amounted to 178, 4443 tons. You will not be surprised that a state, agriculturally alive and advanced as Illinois, used in addition 218,992 tons of rock and colloidal phosphate, of which rock phosphate amounted to over 200,000 tons. Superphosphate of all qualities amounted to not even 30,000 tons. It is really ridiculous when, in view of such widely accepted practices, some amateurs inveigh against rock phosphate. The Illinois Experiment Station, just as some others, has consistently for decades advocated the use of rock phosphate, and so have we. Experience has shown it to be safe, sound, and relatively inexpensive. Besides, it does not add sulfur to the soil as superphosphate does.

Strawberries, Canes, Grapes, Shrubs, and Trees

A few suggestions for the home gardener

THE Nursery catalogues are now on our desks. Five-in-One apple trees, everbearing strawberries, luscious blueberries, gooseberries for pies, currants for delicious jellies, sweet and sour cherries, apricots, Oriental and European plums, blight-free pear trees, thornless boysenberries, Hydrangea, Deutzia, Philadelphus, Lilac, Spiraea, Azalea, Tea roses and hybrid perpetuals exert their eternal appeal to our purchasing power and our gardening instincts. We would really like to buy each and every variety, but we cannot afford so many and, at the same time, we don't have the space for all of them. So we must make selections. This is where the difficulty lies. Not one difficulty, in fact, but a hundred difficulties. For what should we choose?

The nurseryman has to appeal to every taste; he is in a highly competitive business; he is not going to run down his own goods; he leaves the final decision to the buyer where the decision should be. But the buyer often does not know what to choose. It is impossible in one article to deal with all the stock offered in the average catalogue. Many separate articles will follow which will deal with separate questions. In the next issue, we will discuss grapes, in future issues various fruit trees, berries, and ornamental plants, especially roses and evergreens. But a few general bits of advice may be in place.

The small home garden can usually place a few berry bushes, a few fruit trees, and a variety of roses. But it cannot attempt a varied orchard composed of early and late apples, canning and desert pears, and assorted cherries and plums. If you want early crops, buy berries and a few plums, of which the delicious Reineclaude or green gage is perhaps most promising, especially since green gages rarely appear in the average markets. In a shady spot, you can grow a morello cherry. It will do well even on the North side of the house if the soil is otherwise suitable. The garage may allow the growing of grapes in espalier fashion, or a delicate bosc pear trained on wires; it certainly will be suited for various climbers or ramblers among the roses.

If you want to order gooseberries, you must know whether they can be imported into your state. The gooseberry is host to a rust disease, which has made this delicious plant taboo in certain regions. If you like, on the other hand, blueberries, you may have to rely on canned or frozen fruit, since blueberries, like cranberries, are very exacting and will not grow in average garden soil. It is much simpler, much cheaper, and much more gratifying to buy perfect fruit grown under suitable conditions than trying to change your garden soil into blueberry soil. Azaleas and Rhododendrons also demand raw humus of an acid nature; such a soil can be prepared with peat moss, leaf mold, and sand, but it can be more easily done than preparing a bed for blueberry growing. Still, when in doubt, buy another shrub that is less exacting! Lilacs, especially the beautiful hybrids, succeed almost anywhere in the country where the winter is not too hard and not too mild.

This is one matter which must be constantly considered. Plants that drop their leaves are plants of the North which want a winter rest; where the winter is too short or too mild, they will not get that rest and consequently will not bloom after the first year. Most apples and pears have this nature, while peaches and grapes have a greater range. Cherries, especially sweet cherries, do best in regions where there is lime; but a good garden soil, abundant in all plant foods and especially in humus, will bring you enough cherries for the family table.

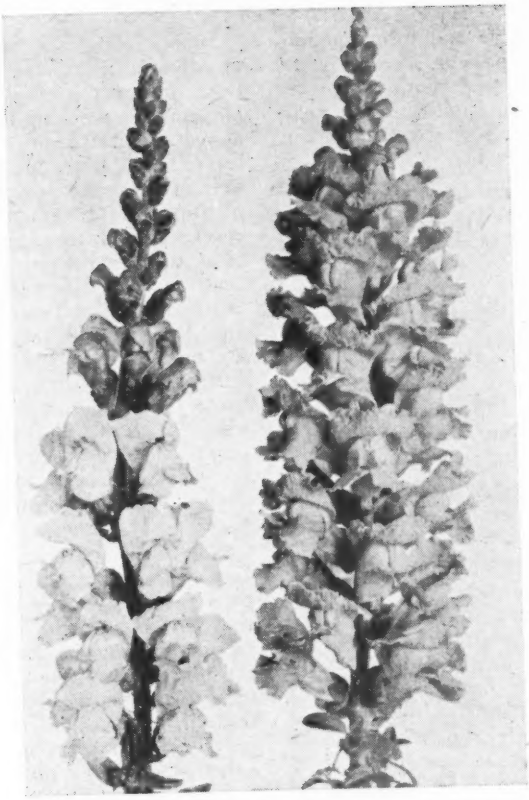
It used to be said that red raspberries could not be successfully grown in the United States. This problem has been solved; yet black raspberries and blackberries are still more successful under average home garden conditions. If nobody around you grows red raspberries, you might give them a trial, for they are truly delicious; but you must not be disappointed if they are less rewarding than other cane fruits. Grapes are always a ticklish problem. Some of them grow rather well in many locations, but they are not so good as we expect them; others that are very fine in flavor refuse to bear as we expect. It may be wise to try two or three varieties, since grapes are not expensive, and to see which one does best under your soil and weather conditions.

What we said about seeds, we should repeat about nursery stock: there is much fun in gardening experimentally. I have ordered and planted over twenty different varieties of apple. Mine will never be a commercial orchard and yet, if they all come into bearing, I will have more apples than we can use for the family. But mainly, I am interested in watching these tree individualities; I am eager to see which variety does best and which will keep best; and I don't think that I have made a mistake or that I have been wasteful. We pay much for an education otherwise, we spend considerable sums for our information; why shouldn't we spend some on our best teacher, Nature, and see what she will teach us?

Not everything you order will succeed, but you will have fun in watching those shrubs, trees, and berry bushes that do succeed, and you would never have that fun if you only planted the four or five varieties that everyone else is growing. You may hit on a variety that nobody has so far tried in your region. When you think of all the fruit trees that are now grown in the Dakotas, definitely not a fruit tree country, you will perhaps be encouraged: many plants have a wider range and a wider adaptability than is generally known. And if you balance between safe bets that every neighbor has and a few daring trials, you will have berries and fruits in addition to unexpected experiences.

With readers in every state of the Union and quite a number in various parts of the world, we cannot give a list of shrubs that are best, nor can we tell which apples or peaches you should buy. But your nurseryman can tell you and the State Experiment Station can also tell you, if you had rather follow the safe route than experiment for yourself. M.

PENICILLIUM is the name of the fungus from which penicillin is made. Penicillium comes from the Latin penicillum, which means painter's brush. The fungus was named after this implement because its growth resembles a paint brush.



COMPARISON OF SNAPDRAGONS: On the right the number of chromosomes were doubled by breeders of W. Atlee Burpee.

Old Fashioned Flowers

By DORIS CLARK

SNAPDRAGON

DURING the winter months I suddenly recalled my childhood days when I had to be more or less compelled to wear woolens. How much I disliked the scratchy material! "It bites," I used to complain. All of a sudden, in my teens, wool no longer had that effect. I did not notice it then, but this last winter it came back to me. Apparently, my skin became tougher as I grew up. But just as my skin hardened, my other senses became less impressionable. I am now more than ever convinced that we recollect our early childhood with such pleasure, because at that age we absorb all things with fresh and unstunted senses, quick-seeing eyes, sharp noses, eager ears. We are then receptive and at the same time criti-

cal: We observe and form opinions and probably become shaped otherwise in outlook and character. That is why the memories of those years are so strong that they keep recurring throughout later life.

One such memory, as vivid as the taste of gooseberries, rich juicy red gooseberries, is connected with the gathering of wild flowers. Children are, of course, closer to the ground and more concentrated on things nearby than old people who have other concerns. For I do not recall ever having had in later life a pleasure similar to the one when I first discovered the wild snapdragons on one of those bouquet-gathering excursions.

Strictly speaking, the wild snapdragon or linaria is a member of a slightly different genus, but perhaps the botanists are wrong and my childhood observation was right? For what is there so similar to the garden antirrhinum or snapdragon as the common weed, Butter-and-Eggs, Yellow Toadflax or *Linaria vulgaris?* I recall the inexpressible joy when I tested its flower and it moved its little snout just as the snapdragons in the garden beds. To call this wild snapdragon a poisonous weed would have seemed the greatest offense to my sense of beauty, propriety, and happy admiration.

Antirrhinum means Snoutflower, and all languages have similar designations, which show that children for thousands of years have played with the individual flowers, snapping them open and shut between thumb and forefinger, amidst the puzzled laughter of their friends. As we grow older, we cease to consider snapdragons as funny things and we perhaps also cease to look at them so closely. We see them more or less as parts of a garden, beautiful in coloring, varied in size, and extremely useful for all purposes. In fact, we begin to look at them as plants for massing, as parts of a color scheme, as long-blooming fillers in borders and around foundations.

Snapdragons are also a favorite greenhouse flower. The growers usually try for a compact plant with many blossoms by pinching the young plant above the third or fourth pair of leaves. This latter method works out well in the open too, though transplanting produces often a good enough check. Snapdragons grow under almost all conditions, except in real heat. Nor do they like fresh manure; but leaf mold and compost suit them fine. In a rich soil, they keep on growing much longer and produce much greener foliage than in a poor soil. Their flowering spikes become denser when they are well nourished. A half shady place does not hurt them. On the whole, I found my snapdragons always at their best when they were grown among other annuals.

Not all snapdragons are annuals. In a medium temperate climate, a good many will come up in spring if they are in a shady location or protected by a mulch. Their roots serve as storage organs, especially if they have been cut in bloom. If allowed to seed, they are apt to die out more rapidly. Then there is a trailing perennial, too, and a number of annual varieties of dwarf habit. For all average gardens, the best and common method is to use snapdragons as annuals and to reseed them every year. If you sow them in fall, early in September, and keep them sheltered in a matted cold frame, you get early flowers in spring. If sown in spring, they stay in bloom during the larger part of summer, well into the fall. Sometimes, however, you may get seed that does not produce fully open flowers when you sow in spring. In that case, the buds do not open on the upper part of the spikes. But I had this experience only once. My practice is to put the seeds in a small flat sometime after Christmas, usually early in January, and to get them up in a cool room. A little frost does not seem to hurt after the plants have come up.

In recent years, many named varieties have appeared on the market.

Purity and White Rock are pure whites; Navajo, Amber Queen, Golden West and Newport Yellow are yellows; Philadelphia Pink and Jennie Schneider, also Geneva Pink, are rose-colored, and Orlando, Afterglow, Yosemite, and Empress are the richer shades of purple and bronze. If you like color schemes, there is an almost unlimited range for blending, especially if you intersperse snapdragons and larkspurs. If you have chosen Supergiant strains, you can even blend them with delphinium giants.

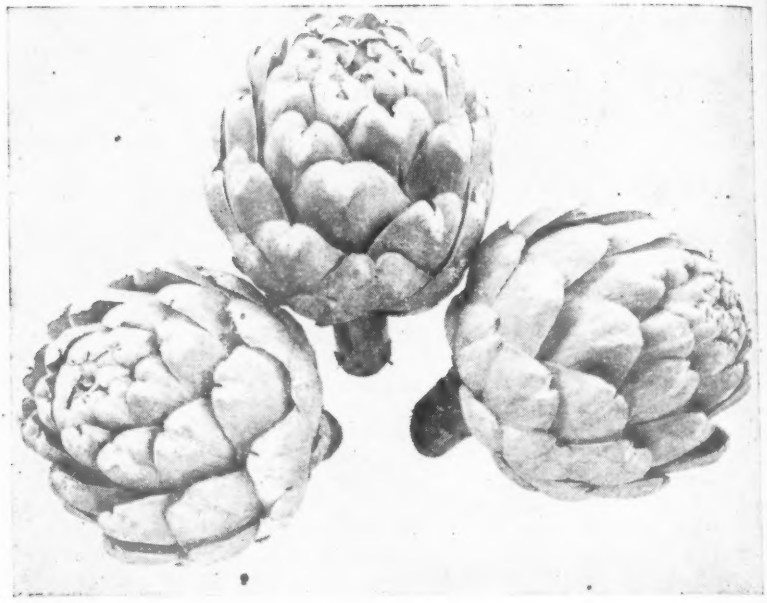
From dwarf varieties to Nanum grandiflorum to super giants you have the range of six inches to three feet. Since there are no blue snapdragons, you can create a rather stunning border by mixing bright canary yellows with a light blue larkspur. Or you can blend dark larkspur and white snapdragons. A very rich assortment of colors appears when you sow columbines and the various double-colored snapdragons in a shadier bed.

Our picture shows an artificial breed originated by W. Atlee Burpee. In the 1920's, it was found that plants would increase in size after a mechanical or chemical treatment that produced a doubling of their dye-bodies or chromosomes. If an extract of the fall-flowering crocus is sprayed on certain plants, such doubling of cells takes place and the resulting plants are a new variety with new characters. As a rule, they are sturdier in size and bigger of blossom. This happened in the case of the snapdragon shown, which is available in the 1946 catalogues.

Snapdragons are sometimes attacked by a fungus disease, but under healthy outdoor conditions, in a compost-rich soil, no serious danger is now encountered, since rust-resistant varieties are generally replacing the weaker plants of former days. I have often wondered why some flowers became receptive to such pests and I have come to the conclusion that plants deteriorated because they were too much inbred and, at the same time, grown too long in one region. As a result, they lost their ability to adapt themselves to the unforeseen. As soon as a new hereditary element came into them, by crossing and hybridizing, greater vigor resulted. This is where we now stand with snapdragons—we have plenty of them, in all colors, of varied types of growth, various size of flower, and good health.

You Want Sulphur In The Soil?

"IN THE preparation of superphosphate the equivalent of 310 parts of tricalcium phosphate are treated with 196 parts of sulphuric acid to form 272 parts of calcium sulphate and 234 parts of monocalcium phosphate. In this reaction all of the sulphur contained in the sulphuric acid is found in the finished products of superphosphate present as calcium phosphate," writes J. W. White of the Pennsylvania State College in a letter to Mr. Rodale. And he concludes that, on the basis of this reaction, superphosphate "contains 12.6 per cent of sulphur equivalent to 252 pounds per ton." Our readers know that sulphur tends to acidify the soil. They also know that phosphate rock does not contain this additional sulphur and thus does not set off unusual reactions in the soil.



ARTICHOKE McFarland

Hints for the Victory Gardener

This is the fortieth of a series of articles by this author dealing with the cultivation of ordniary vegetables.

CARDUUS — THE THISTLE

By ROGER W. SMITH

AT first glance it would seem unlikely that any gardener would cultivate thistles in his vegetable garden; too often they flourish uninvited and unattended. As you know there are many kinds of thistles, sow thistles, Canada thistles, etc. Laws have been enacted aimed at the prevention of their spread. Only the most broadminded of gardeners would admit of anything either useful or beautiful about the thistle. The immense thistle tribe cause a lot of trouble. They are said to be native to the Balkans which may or may not explain this tendency.

You know the thistle quite well. It is unnecessary to describe it except to mention that it is a prickly herb with leaves that have spiny margins, that its flowers are often crowded into a spiny-bracted head. We'll

admit that there may be over two hundred known species—altogether too many, anyway—and let the matter go at that.

But glancing over this formidable, prickly tribe, we notice one *C. benedictus,* commonly called the "Blessed Thistle", Our Lady's Thistle, or Sweet Sultan, long a flower garden favorite. It is an annual, easily grown from seed. Its flowers are yellowish, dense thistle-like heads, about one inch in diameter.

This in turn brings us to the Centaurea of the flower garden, the giant Sweet Sultans, *Centaurea Imperialis,* sweet scented, gorgeously colored, with fringed petals; it brings us to lilac hued *Centaurea Americana* and Double Cornflowers, blue and red. In these we see the cultivated members of the thistle tribe take their place in milady's bouquet.

Even so, you may say, the vegetable gardener isn't especially interested in ornamental thistles. A thistle by any other name would be just as prickly. But you look over the thistle tribe again with renewed interest. You find the Genus *Cynara,* so named by the Greeks because they thought the spiny bracts looked like dog's teeth, a group of about a dozen coarse, thistle-like herbs native to the Mediterranean area, *two of them yielding garden vegetables.*

The first of these is *C. cardunculus,* a perennial herb reaching six feet in height commonly known as the Cardoon. It has grown in the garden for its fleshy leaf-stalk.

You will find it easy to grow a few rows of Cardoon. In the latitude of Philadelphia, the seed should be sown in the early Spring in hot bed or cold frame. The seedlings may be set out, after danger of frost is over, about three feet apart each way.

The soil should be rich and contain ample organic matter and moisture to support the large, leafy plants. The natural richness of the garden soil should be supplemented with such organic amendments as compost humus or well rotted manure. Above all, the soil should be especially well drained. Sour, mucky locations should be avoided.

Cardoon is little bothered by plant disease or insect pest and requires only sufficient cultivation to keep down weeds.

In the Fall the outer leaves are drawn up and tied around the plant which is then wrapped in paper to exclude light somewhat in the same manner in which endive is blanched except that the plant is much taller. Almost any method of blanching you may find convenient will probably be satisfactory, so long as you avoid heaping soil over the crowns as this may rot them.

Because of the great size of the plant, blanching in the garden is not easy. The blanching and storage of cardoon for winter use may best be accomplished together by lifting the plants with as much earth as possible adhering to the roots and replanting them close together in a cool, dark cellar. In this way they will blanch without covering. This method is the one most commonly used in commercial practice.

You may like the flavor of the boiled leaf stalks. They possess a slightly bitter tang which, like the slight bitterness of endive, you may find refreshing and appetizing. Blanched cardoon stalks make a very desirable adjunct to soups and stews.

Looking over your tall cardoon plants, you may wonder about their relationship to the thistle. Just to be sure you note the deeply cut leaves white and felty beneath, grayish-green above. You look up at the densely crowded *purple* flowers surrounded by their spiny bracts. You pull one down. There it is sure enough, an easily recognizable *thistle* flower head.

And from the cardoon, a rather humble garden vegetable, you turn to that aristocrat of the garden, *Cynara scolymus,* the Globe Artichoke, another member of the thistle tribe. It is believed that the Globe Artichoke was derived by cultivation from the cardoon.

The Globe Artichoke is a much shorter growing plant than the cardoon. It is very little spiny and rather delicate in its habits.

The large, unopened flower heads with modified bracts are broadbased and rest upon swollen receptacles—the stem ends upon which the flowers are borne—these are the edible parts. The bracts are the most important of the edible part—bracts are small leaf-like organs confined to the stalks of a flower cluster which surround and protect the flower until it opens, when they frequently fold back or drop off altogether.

It is the brightly colored bracts which bring beauty to the poinsettia and the flowering dogwood. It is the green, fleshy bracts of the Globe Artichoke which give it value.

Although the Globe Artichoke, which is a perennial, does not usually run true when grown from seed, you will find few varieties from which to choose. "Green Globe" is a favorite.

An ounce of good seed should produce about five hundred plants. Sown under glass in flats, or grown in boxes placed in a sunny window early in the Spring, the seedlings should be set out when they are six weeks old and not moved thereafter.

The plants you grow from seeds will tend to vary greatly. It is unlikely that you will harvest many flower heads the first year. On the other hand, you will be faced with the proposition of retaining those plants which you think are the best and discarding others; in a small way, developing your own strain.

A much quicker and more convenient way to start a planting of Globe Artichokes is to start with rooted slips or suckers obtained from around the bases of old plants. In the Spring, when the leaves of the suckers are about a foot tall, they should be pulled from the parent plant, severely cut back, and set out eight to ten inches deep, and five feet apart each way.

A planting will continue to bear edible flower heads for three or four years. Because of its permanent nature the planting should be kept at one side of the regular garden. Each plant should yield at least a dozen good buds per season, depending very much upon the vigor of the plant.

To obtain vigorous growth and good yields you will find it essential that the soil in which the plants grow is very rich, that it contains an abundance of new compost material or well rotted manure. The moisture content of the soil is important during the time the plant is making its rather rank growth; it is even more important at the time when the plant is forming its large succulent flower heads.

Only a rich soil, well supplied with organic humus can retain in a readily available form sufficient plant-nutrient rich moisture to supply this demand. To give you an idea of the fundamental importance organic matter plays in the success of this crop, it is worth mentioning that, in commercial practice, ten tons of stable manure per acre is usually plowed in each year following the last harvest of that year.

Your next problem will likely be the over-wintering of the roots. Late in the Fall, after the ground has frozen, the old stems of the artichoke plants should be cut off leaving stubs about a foot tall. Each plant should then be covered with a foot deep layer of some porous substance such as leached cinders, loose gravelly sand. Straw, earth, leaves, etc., should not be used because of their tendency to retain moisture and because the crowns rot very easily. It is interesting to note that this tendency is also quite marked in the Cardoon.

Some gardeners cover each crown with an inverted box or flower pot to keep the crown dry and then mulch the surrounding area with straw and salt hay.

But whatever method you adopt, the material used for winter protection should be promptly removed in the Spring.

In the growing of a few dozen plants of Globe Artichoke, experience

will soon teach you much. Even in the matter of harvesting the flower heads your good judgment will be put to the test to decide just when the heads are ready. You will quickly learn that a flower head should never be left on the plant until it becomes so old its bracts become hard or woody, since this severely checks the formation of other flower heads.

Often the large flower heads of the Globe Artichoke are boiled, much like asparagus, chilled, and served with drawn butter or a sauce. You might find them quite delicious. You might, also, while you are enjoying their delicate flavor, remember other members of the thistle tribe—the sow thistle and the Canada thistle—and think less harshly about them.

Garden Calendar—March

North Temperate Zone: March is the real starting month, time for preparing the garden, digging under refuse and compost leftovers, time for transplanting and grafting trees.

You sow all the root crops. All root crops are biennials and will grow throughout the year; nor will cold weather damage them.

You sow lettuce and spinach and onions. Contrary to general belief that onion sets are best for the average home garden, we recommend in the Northern garden the sowing of seed. At the end of the year, you will have medium sized onions of good keeping quality, while onion sets may fail if the weather is not favorable.

Try leek and salsify this year, put them out around the beginning of March if possible.

With lettuce and spinach remember that you had best repeat sowings later, so don't make too large a bed at first. But stick radishes in between here and there so that there is no shortage.

The berries can be pruned; be careful with gooseberries because they bear on old wood.

Flower gardening starts on the whole line: Try new things, Clarkia and Salpiglossis if you haven't done so before. Try a few new gladiolus and a few Tritonias with them. Practically all the old fashioned flowers go out this month. Have you seen Balsam recently? It's oldfashioned, but very attractive.

South: Keep up the work begun in February. This is the last chance for cool weather crops, the first for the warm weather crops, such as Thunbergia or Moon Vine, which are so attractive over a Southern Porch. Coral Vine must not be disturbed much if it is to grow well. Annuals of all sorts go into the open.

Old Rule: A dusty March is worth more than silver and gold.

Lime — The Catalyst

By OLIVER LAWRENCE

A POPULAR delusion exists that lime is merely a neutralizing agent in the correction of an acid soil condition. Old agricultural books frequently make reference to lime as a fertilizer, and as such it has an important place in soil fertility. It has been a valuable soil amendment since prior to the start of the Christian Era, for even in the olden days leaching and cropping, the principal factors which establish lime deficiencies, were depleting the soil. Limestone is a sediment of former oceans and, therefore, underlies the entire Mississippi Basin between the Rockies and the Alleghanies.

Early in life we become acquainted with lime. Nature has endowed our first food, milk, with large quantities of calcium. There is a definite linkage between health and lime. History is replete with accounts of the superiority of men and beasts from lime-rich areas over those from parts less fortunate in lime supply. The total absence of lime from food may stop bone and teeth formation, no matter what quantities of other needful colloids and crystalloids are furnished. Oyster-shell flour has special value in iodine-deficient sections of the country. If the food of a mother be lacking in lime, she robs her own tissues for the benefit of her young. After weaning, insufficient lime in the diet causes rickets. In any dietary scheme, lime ranks with proteins, carbohydrates and other important factors in health-giving values. That it should be present in all properly balanced farm rations has long been accepted as fact by good animal husbandrymen. As humus and animals obtain their calcium requirements from food, the source and processing of the things eaten merit careful thought. Carried to logical conclusions, we are what we eat. Lime content of the soil influences not only plant and animal life but the economic position of a community.

In the humid regions, as in the Eastern areas of the United States, the need for lime in the soil is greatest. In the dry land areas of New Mexico, Arizona, Utah, California and the Pacific Northwest, where an alkaline soil predominates, it is often necessary to correct an alkaline reaction. Continuous irrigation over a long period of years has a tendency to accentuate this alkalinity, which may be corrected by resting the soil for a year or two. An excess of alkalinity may be counteracted by the use of larger quantities of leaves (generally acid) than customarily find their way into the compost heap and the elimination of lime in making compost for these alkali regions. Bacteria of the kind that are useful to the gardener do not thrive in a soil which is too acid, and the use of limestone in compost makes more palatable to these and other soil organisms the material which is to be broken down. Lime in the compost heap or in the soil establishes an environment more conducive to propagation of micro-biological life which is so important in furthering plant development. Soil structure is improved by lime, making for better aeration and permitting roots to adventure to deeper strata searching for mineral-enriched plant food. Many plants are diseased because they grow in hard packed soil; lime helps to correct this handicap. Certain weeds grow only in an acid soil; lime helps

to eliminate these. Soil which is rich in compost and lime is easier to work. Plants are more tolerant of acidity in a soil well supplied with organic matter than in soil not so favored. This fact was brought to light as the result of experiments in Virginia in 1937. Lime helps to preserve nitrogen in manure. This was determined by tests at the New Jersey Agricultural Experiment Station, using hydrated lime and manure. Heretofore, quite a popular belief held a contrary opinion and many poultrymen hesitated to use lime on their dropping boards. This represented a hold-over from the days when quicklime was relatively more extensively used in agriculture than is now the case. Ground limestone, Dolomite and hydrated lime have become more acceptable.

The basis on which the various limes are evaluated is the content of available or effective calcium and magnesium oxides. Chemical and physical analyses are needed. The chemical analysis establishes the percentage of oxides and the physical (screening) analysis determines the physical fitness of the lime particles. Liming material must be mixed thoroughly with the soil particles for best results, for the plants. Lime, by its flocculating or crumb-forming properties, better permits water to permeate the soil. In considering lime and how much to use, give thought to the purpose (quick or slow acting); kind of crop to be grown; soil type and its reaction; and what lime is most economical. When one appreciates how quicklime is used to destroy dead bodies and how builder's lime "bubbles" in water, it can more readily be understood why ORGANIC GARDENING frowns on these forms of lime because of their obvious inhibiting effect on bacteria. Dolomite (a form of lime rich in magnesium) is slow acting and has some residual effect on subsequent crops; whereas hydrated lime, having smaller particles, takes more immediate hold. Because Dolomite is linked to magnesium, and there is a magnesium-potash relationship in the soil, when this form of lime is used the potash requirement is lessened. Hydrated lime is identified with calcium. A better balance obtains and the danger of an excess of magnesium eliminated if there be a variation of the type of lime used from time to time.

Continued neglect of liming contributes to loss of soil fertility. Ultimate crop failure eventually results, followed by a substantial decline in land values. The sale of soil fertility is not income or profit. Conclusive tests by U. S. Government and various State Experiment Stations have demonstrated beyond doubt the benefits from intelligent application of lime, whether via the compost heap or directly to the soil. Successful gardeners and farmers have made dollars from sense with lime.

EDITOR'S NOTE: If you are interested in any particular phase of liming, you may secure pamphlets regarding lime and its application to various crops from the National Lime Association, Washington, D. C.

FLOWER PAINTING reached its peak around 1700. The Dutch masters were most renowned. Flower and Fruit painters of especial repute were HUIJSUM, DE HEEM, VAN DER MIJN, and RUYSCH. When Rubens needed flowers in one of his paintings, he always commissioned an expert flower painter to do that part of the job. Fancy Parrot tulips occur frequently on those canvasses.

Thesaurus

DECIDUOUS—*plant that drops its leaves annually as distinguished from evergreens, both coniferous and broad-leaved.*

HEEL—*that part of the trunk or main stem remaining on a slip or cut. May occasionally assist in rooting, but usually is not necessary.*

HEEL IN—*common practice with trees and shrubs received from a nursery. A ditch is opened, the trees are placed in it and earth is thown over the roots to prevent their drying out. The trees are usually placed at an angle so that they are less easily shaken loose.*

DISBUD—*breaking or cutting off the majority of flower buds in carnations, peonies, chrysanthemums, and other plants for the purpose of allowing the remaining bud to become a showier, larger flower.*

SHIELD BUD—*part of a plant that is to be budded on another plant or understock. It is customary to leave part of the twig on the shield. The shield itself is an oval piece of green wood, usually with a small part of solid wood preserved. This distinguishes the shield bud from the eye.*

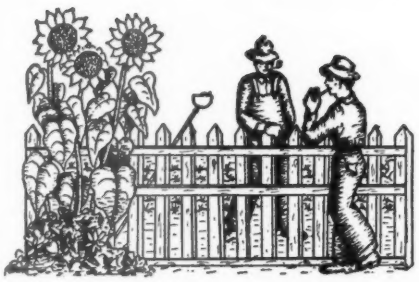
EYE—*a bud with part of the petiole or leaf stem, cut out of a desirable variety for the purpose of budding. This eye is usually inserted under the bark of the understock which has been opened by a T-shaped incision. Especially common in inoculating roses.* (oculus-*eye*).

PINNATE—*literally feather-shaped. Refers to the arrangement of veins in a leaf or of leaflets. The picture shows a pinnate arrangement of leaflets, such as occurs in roses.*

SCION—*the part of a plant that is inserted into the stock or understock in grafting. This is the easiest method of propagating certain varieties of trees, especially nut trees, and also of rejuvenating old trees.*

AQUATICS—*water plants, such as water lilies, sweet flag, etc. In horticultural usage not a very rigorous term.*

SPAWN—*in gardening language applied to the starter of mushroom culture. The spawn is applied to fermented horse manure, then covered with earth to develop into a mycelium from which the spore-bearing tops, the edible mushrooms shoot up.*



Over the Fence

by H. K. MEYER

Helmut Siber's drawing of an oak in the last number of the magazine reminds me of the ancient people who looked at trees as sacred beings. Every tree was inhabited by a nymph, certain trees were especially hallowed and revered as shrines. This is one reason why, when Christianity arrived, many such trees served as receptacles of small shrines for devotion. Is it a sign of the machine age when people lose the awe of great works of nature, such as the gigantic trees on America's West coast, and when such miracles of creation are cut down for shingles? The artist makes us again feel the greatness and beauty of creation when he shows us such a tree personality.

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With St. Patrick's day falling into this month and the *Irish College Boys* directing our glances toward Eire, I am recalling my meeting one of the great Irish poets, Russell, who wrote under the pen-name of A. E. I heard him talk one evening on his work for Irish agriculture. Ireland is now, beside Iceland, the only country on earth where a poet and an agriculturist go easily hand in hand. And Ireland is not the worse off for having poetical farmers and farming poets.

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To make a naturally fertile soil productive is not an easy job, since productivity depends on soil structure. We are again happy to quote from *The American Fertilizer,* vol. 103, No. 110 to show that the chemical fertilizer industry is *becoming more and more aware of the importance of organics.* "The best and only sure way we have of building and maintaining good soil structure is through the growth of sod crops and the return of liberal amounts of organic matter," says the article in quoting from Professor Page of the Agronomy Department at the Ohio Experiment Station.

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The agricultural literature of the last year shows clearly one feature—postwar farming will put the greatest emphasis on pasture and sod crops, on dairy farming and restoration of organic matter. Phosphate fertilizers are increasingly being applied to pastures and the hope that our soils can yet be saved for many more centuries of fertility is growing. Organic treatment does it. Replenishing organic matter is the method. And ground rock phosphate should be more considered, since it is from all aspects the best source of phosphoric acid. Farmers would save millions if they used it instead of super and triple phosphates.

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One of our readers, a Doctor in California, wrote us that the application of chemical fertilizers has ruined his citrus orchard. He wants to restore the fertility by organic means. He

can, over a period of years, do so, as others have done, especially in South Africa.

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Everytime I see one of the articles of Calvin Byers I think that he is one of the great writers of our day. His outlook on nature is so round and rich that many millions of readers can profit by his thoughts and observations. A little item about the squirrel that appears in *It's a Fact* in the January number was inspired by his thought: If squirrels were eating each other's stored nuts, they would long have died out.—Why is the human species so vengeful and rapacious?

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And here is another science item: "Application of mineral fertilizers including nitrogen did not help in the maintenance of the soil nitrogen level in the surface soil nor have a pronounced effect on the rate of nitrogen depletion." Leo F. Puhr, *Technical Bulletin* No. 4 South Dakota Agricultural Experiment Station at Brookings.

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Did you know that quick freezing is not such a wonderful thing as the quick freezers think? Gilligan and Woodmansee of the University of Delaware found out that kale lost much of its vitamin value when frozen; fortunately, the Tennessee people found out that vitamins were reformed when frozen spinach was cooked. But Delaware wants to be sure and adds phosphates when cooking greens. Life is getting so complicated. Why not just store or keep in the garden some green vegetables like kale, parsley, leek, endive, corn salad without freezing them? Or where it is too warm for keeping them over the winter, why not grow some in a window box? It is much less expensive than freezing and cooking by laboratory methods.

Our recent manure loader article finds splendid confirmation in an article by Carlton Stoddard, written for *Successful Farming*, in which the famous Renk farm of Sun Prairie, Wisconsin, was described. The Renks keep the cattle on the manure bedding, keeping the cattle warm and restful, at the same time preserving the valuable nitrogen in the manure. In Spring, the manure loaders go to work and remove the fertility to the field. "A giant scoop shovel had a third of the 100 by 100 concrete feed yard scraped clean before I could get my camera set up," writes Carlton. That farm sent out an 86-car train of produce, a car load of sheared wool, 25,000 bushels of hybrid seed corn and 10,000 bushels of Vicland oats—all produced on 850 acres by modern methods of labor saving and no organic matter lost. "Nothing can get away". This is a modern form of the Fold Yard system which Sir Albert Howard and J. I. Rodale have advocated for cattle raisers.

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J. I. Rodale's *Pay Dirt* was very ably reviewed in many places. Among the most penetrating and understanding discussions was the one by Russell Lord in the New York Times Book Review. Russell Lord, who runs a 2,000 acre farm himself, is also the editor of the quarterly *The Land* and will before long open its pages to a symposium by various experts on Rodale's *Pay Dirt*.

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Russel Lord writes a column for *The Progressive Farmer*, Raleigh, N. C. In it he said that Sir Albert Howard had recently died, and did our readers send in questions . . . Sir Albert may answer for himself. It's even better than a similar answer that Mark Twain gave one time under similar circumstances: "The cutting from the Progressive Farmer is a bit too progressive as I am very much

alive and don't feel like dying yet awhile." Sir Albert who reached his 72nd birthday on December 8, 1945, eats all the compost-grown food he can get, and we are sure that Russel Lord will join us in wishing that Sir Albert's best third of life lies still ahead.

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I want to call special attention to the item *Organics and Soil Improvement* in this issue. It is another one of those scientific proofs which are so carefully carried out and then so little heeded in actual practice. The existence of entire industries, for example, the banana industry, the citrus industry, the coffee industry depends on proper organic fertility. But only the coffee growers have become fully aware of the issue, largely due to the genius and activity of our contributor, Senor Don Mariano R. Montealegre, the brilliant editor of the widely read *Revista del Instituto de Defensa del Cafe.* Our series, Return to the Land, articles by J. I. Rodale, and other organic writings were there translated into Spanish, so that organic information of North America is available to the growers of coffee in Central and South America, where the "RIDC" is widely read. We should also call special attention to the item *Organic Compounds,* because it will offer the tobacco growers and many other agriculturists some food for thought.

Organic Compounds

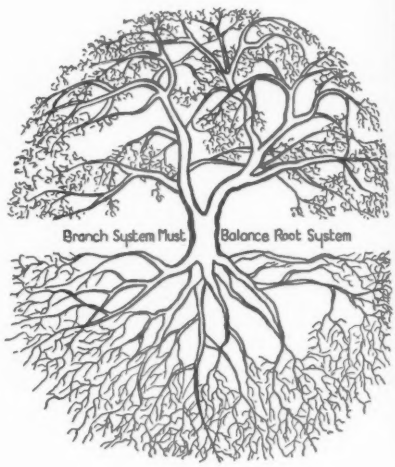
A. V. VLADIMIROV, the Russian soil scientist, published in *Soil Science,* November 1945, a study on the effect of different fertilizers on the composition of plants. How does potash, such as is supplied by organic material or wood ashes affect the formation and storage of organic acids in plants? (Organic acids are for example citric acid, malic acid, which everyone knows as constituents of fruits and berries, but which also occur in other plants, for instance, tobacco.) The interesting result was that the potassium alone could not show correct results, but that it acted differently *according to the kind of nitrogen* that was supplied the plants. The details need not be gone into, because we are mainly interested in the general aspect, especially since we have previously pointed out that plants do not take up elements. This is a new confirmation of this fact. Plants use potassium according to the *form* in which nitrogen is available to them. Vladimirov found out how to increase the value of tobacco as well as caoutchouc-producers, oil producers, etc. by varying *both* nitrogen and potash fertilization. In the end, we will no doubt learn that the oldfashioned chemical method which dealt with one element after another cannot give the answer to plant nutrition. If you add one substance, many other factors change and the composition of the plant changes too. This is the fundamental thesis of *Organic Gardening.* For all present practices of food growing we must still say: The less we tamper with natural conditions, the safer we are. For science is only now beginning to teach us how chemicals affect the growth of plants. Nature has known for a long time, how organic substances produce healthy plants.

Pruning Fruit Trees In Summer

By G. L. WITTROCK, New York Botanical Garden

THE question as to when is the best time to prune a fruit tree or to trim trees in general is usually answered by the average man, "Whenever I have the time." The time seems to be with most in the spring, the fall, and even during the winter months, rarely during the summer. By many summer pruning is considered wrong, in spite of the fact that it is the best period of the year for most types of trees in general and particularly many varieties of fruit-bearing trees. The general practise is to prune trees in the early spring, when the urge to get outdoors is so tempting. The soil is too wet to work, thus the only thing to do is to clean up the grounds and trim the shrubs and trees, cutting out the dead branches and the "winter-kill", and prune in general. No thought is given as to whether the spring period is the best time to prune, nor how the tree may respond to the spring shearing. Further, how does spring pruning effect the bark of the tree? Thus the important points to consider are first: when is the best time to prune a tree; and secondly, what is bark, its relation and service to the tree?

Let us first discuss seasonal pruning, starting with the winter months. What is the general response to the tree when trimmed during the cold dormant period of winter? First, all one really can do is to cut out dead branches, and summer injury, but even this is not simple because "winter-kill" cannot be easily detected until the sap begins to flow. The more severe the cutting, the greater will be the sucker growth in the spring, a natural law of tree growth. Not only will many dormant buds open in the spring that would normally not burst, but adventitious buds will develop from the bark tissue, particularly on branches that have been cut back or "topped". Secondly, winter pruning is not a comfortable time because of the cold, the danger of slipping on icy branches, and because of the brittle nature of the branches during winter

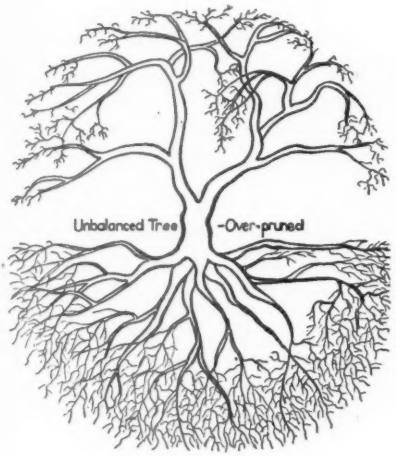


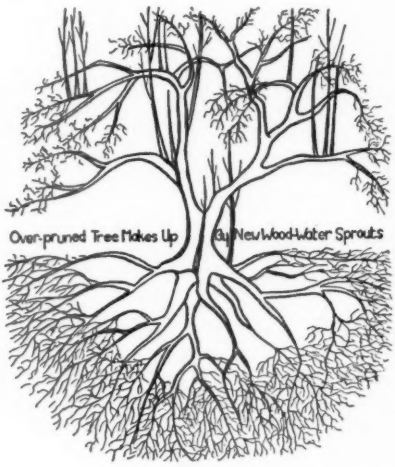
when they may easily snap under the weight of a "pruner", resulting in the possible loss of an important branch.

Fall pruning has one advantage over winter pruning. The icy condition of the branches does not exist. But what can one really prune during this season? Only the summer injury and sucker growth can be cut out; "winter-kill" could not be anticipated, so a second pruning would be necessitated. The tree, however, will follow the law of sucker growth proportional to the severity of the pruning the following spring.

Spring pruning, the season when most of it is usually done, again has some factors to be considered indi-

cating that it too is not the best period for pruning. True, one can remove all "winter-kill" and bad branches of the previous summer growth, but the tree's response to the pruning is surprising. This leads to a second law of tree growth: the root system of a tree balances its aerial shoots or that part of the plant above ground which includes the trunk or stem, the branches, the leaves, the flowers and the fruit. If the portion above ground of a tree is reduced by cutting, the over-balanced root system will respond accordingly. By its powerful osmotic root pressure, the roots will send up excessive stored food material and induce proportional aerial growth, forcing normally dormant buds to burst open and grow, or stimulate the formation of adventitious buds. These buds, however, are wood buds, or buds that will produce only foliage and wood, not flowers. The result is suckers, water sprouts, and excessive vegetative growth; all this at the expense of forming new flower buds and even acting as a check on the flower buds that have already been formed. A situation of this kind was observed last summer while visiting a small orchard on a farm near Emmaus, Penna. The apple trees were in bad condition loaded with dead branches. The centers of the trees were crowded with excessive naked water shoots and with suckers towering through the crowns of the trees. These vertical shoots had rubbed the horizontal fruit bearing branches so badly that many of these important branches were killed. The farmer thought his trees to be in a hopeless condition and when he asked me the cause of it all, I answered that it was sheer neglect, aggravated by excessive spring pruning. I pointed out the water sprouts which were from 2 to 3 years old and how they had rubbed and injured the bark and killed the once excellent horizontal fruit bearing branches. Other fine branches were dead due to crowding. Naturally, with such an excess of wood, plus dead material, the fruit was small and bitter, almost reduced to the primitive form of the apple. The farmer condemned his trees as too old to trouble with and said that he planned to take them all out and start over again with young new stock. This I discouraged. At least I advised him not to destroy his present trees until the new ones started to bear fruit. I explained that by proper pruning, these trees could be rejuvenated and even made to bear good fruit within 2 years, while the new stock would require at least from 5 to 7 years before





he could expect a reasonable harvest. I described the results of excessive pruning, how it induces the formation of water sprouts particularly in the springtime. He was most surprised to learn that summer pruning is practical and particularly that it induces the production of flower buds for the next year.

Why not prune fruit trees in the summer months if it really stimulates flower bud production? I explained to the farmer that summer pruning, say in late June or early July, after the flowers have set and small fruit are already visible, is practical. In some varieties it will often result in fruit each year instead of the alternate years so often true of many apple varieties. Cut out excessive green branches if weak, even with fruit on them, since reducing the amount of fruit gives the remaining fruit left on strong branches a better chance to grow. All the excessive growth potential in the tree will be diverted from making suckers, to increasing the size of the fruit and even accentuating its taste. The farmer was interested and then suddenlv thought the whole task impossible with the lament, "It would require trained knowledge to prune correctly". I told him that is not entirely true explaining that it requires the understanding of a few basic principles, a bit of common sense, sharp tools, and a realization that a tree is a living thing that will do its best if given half a chance. And that lead to our conversation on an understanding of bark.

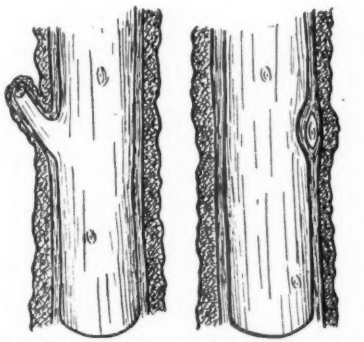
What is the function of bark to a tree? Ask your friends and note how many really know more than that it serves as a protection. The simple concept that bark is a protective tissue is true, but there is more to it. The inner bark is living tissue and ever ready to heal. The outer bark is a preservative, rich with cork cells protective against cold and water and contains deposits of various chemicals particularly tanning serving the bark as a protection against insects and fungi. Bark is functionally the same as the skin on our bodies. When we break or tear our skin, we quickly disinfect it and become much concerned about its healing. Why not feel that way toward the bark of a tree? If bark is not injured it will preserve the tree to a ripe old age. Think of the giant Sequoias of California, what is the secret of their longevity? Some of these trees are calculated to be over 3000 years old and are still growing. One reason for this is the unusually heavy bark, normally over 6 inches thick, rich with cork cells and tannin preserving the trees and excluding fungi and insects.

Healthy bark means a healthy tree; and with proper pruning and at the right time of year we will be rewarded with the maximum amount of delicious fruit and a beautiful tree in general.

In pruning, we must under all conditions think of the tree as a living organism. Under the outside corky bark, which corresponds to the epidermis of the human body, there is the live stratum of the tree, the fibrous and green bark, as it is sometimes called, or the cambium layer. If you cut a branch, leaving a long stub, the cambium cannot close over the wound as well as it would if you had cut the branch near the trunk. The illustrations show you why. A properly cut branch is surrounded by cambium which will swell and gradually cover the wound, because the sap of the tree passes right through it and around it. But a stub is a dead end. No sap goes through, no disease organism is carried away; The branch gets infected and the infection may work backward into the main trunk.

Another aspect of the bark is similar to that of the skin in the human body. If you receive burns or other wounds, covering great amounts of the body's surface, much blood plasma may be lost. Then you need a transfusion. If you cut a tree early in spring when the sap rises, the tree may actually bleed to death. Not all shrubs and trees are equally vulnerable, but some are. Conditions outside have much to do with the bleed-

ing of trees: Soil nutriments, moisture, and air temperature. How greatly these factors affect trees is known best from the example of the sugar maple which "produces" only under certain conditions of temperature. Just the same, some sugar maples yield more under favorable conditions, and similarly all trees are individuals that must be looked upon as separate entities. You cannot prune them all alike, you want to take care of them as individuals and preserve their innate structure and habit.



Poor Pruning—the stump does not heal but rots—

Branch should be cut at trunk so that callus can form over wound—

Organics and Soil Improvement

J. B. HESTER published an article in *The American Potato Journal* of January 1937, to which our subscriber Detwiler calls our attention. An interesting passage in this article states that the aluminum content of certain soils is too great for proper plant growth, because the soil reacts acid. But now the strange thing happens—you add peat moss, which may be much more acid yet and which may have a very low nitrogen value, and the aluminum becomes balanced. For the addition of the *organic substance alone is adequate* to allow plant growth. The organic content of the soil was increased to only 5.8 per cent by a peat moss of the acidity pH 3.8, and plants "grew satisfactorily." What happens when the soil organic content is increased? Aluminum no longer goes into solution, calcium remains available, and thus phosphorus remains also available. Quite independently of the calcium effect, phosphorus availability is directly affected by the presence of adequate organic matter. Another *proof of strictly scientific nature for the effect for organics.* They not only change the reaction of the soil, they even determine which minerals are available for plant growth. It would be interesting to see if the alkaline soils, which now suffer with diseased citrus plants, do not respond similarly. If the organic method were followed, we would not have the symptoms of citrus decline, under which so many growers are now suffering, if African experiences in this line allow any conclusion.

Poisonous Plants

By ROBERT O. BARLOW

5. DIGITALIS

DIGITALIS means thimble or glove, and our common name Foxglove indicates the same impression. Children all over the world have, no doubt, used the flowers as thimbles after they had dropped off from their fertilized seed containers. Still, Foxgloves, however attractive, are among the most poisonous and, at the same time, most useful flowering plants. For they produce one of the most important and at the same time, most elusive, poisons.

All foxgloves are poisonous, though some are more so. The difference is in the soil and general environment rather than the species. There are four or five red, yellow, wolly, etc. foxgloves, of which only the red one, *Digitalis purpurea,* is acknowledged in our Pharmacopoeia. Every analyst who worked on the subject has said that individual plants differ considerably as to potency and that fertilizers have a particular importance. In nature, these plants occur in moist woods, especially on clearings of deciduous forests. The first year, a rosette of leaves comes up, the second year the flowering stalk. If the soil is rich in manganese, the leaves are said to contain more of the sought-after poison. The same poisons go into the seeds and are transmitted to the next generation. In other words, the plant does not use up the various poisonous agents, but hands some of them on to the next generation by means of the seed-leaves, the cotyledons, which everyone knows from watching the two parts of a bean turn into the bean's first "leaves."

Now what are these poisons?

If you look up the subject in a chemical treatise, you will find, as always in such instances, some fifty-odd references to the various component parts of the digitalis leaf. For it is only the leaf in dried form that is used in modern medicine. And "dried form" means that all sorts of

DIGITALIS

precautions are necessary to preserve the dryness of the powdered leaves, lest their potency be lost. Every chemist finds a slight difference and no general agreement exists on what is important; for according to the method used, different substances can be extracted, some soluble in water, some in alcohol, some otherwise. They all consist of nothing but Carbon, Hydrogen, and Oxygen, and can, under some circumstances be changed into other substances containing different amounts of Carbon, Hydrogen, and Oxygen, some of which are just about like sugar. On the whole, of course, all these substances are, in a

way, sugars and therefore called glucosides, which derives from the Greek word *glykys*, meaning *sweet*. It is really amazing to think how living bodies, especially plant bodies, (but naturally animal systems too,) make such unique combinations of common elements which we eat every day and how they also produce a complicated poison, that cannot quite be tracked down.

How do the digitalis poisons affect people? They act upon the action of the heart; at the same time, they usually speed up the pulse. The digestive system, eye sight, temperature control, and other nervously controlled parts of the organism are more or less affected. Sometimes, the poison acts only after repeated administration of small doses which seemed quite harmless at first; but digitalis poisoning is rather quickly diagnosed through the peculiar effect on the heart's action, its irregular and intermittent, but powerful beating. Since a lethal dose is thus a rather vague term, digitalis is hardly ever used for deliberate poisoning. For the patient could still call a doctor and tell him that the bad stepmother gave him something to drink.

True, there is no chemical means of determining the power of digitalis with safety. It is for this reason that it is measured in physiological terms, much as the vitamins, by reference to a certain standard. Now, there are some who object severely to using animals in testing out poisons, but there simply is no other way in the case of digitalis. To make sure how strong the stuff is, a certain number of cats have to be exposed to its effects. This is a sad state of affairs, of course, but then, though we all like living, it is only natural that we try cats before we administer to humans, just as cats eat mice before they devour each other. Fortunately, this is not done very often, and I have never known a druggist who had the time to test digitalis like this. It's much easier for him to order fresh stuff from the supply house. The concern over animal experiments is thus largely academic where digitalis is concerned.

Mr. Rodale related the other day an interesting story on the old herb women who gave their patients a concoction made of many different plants. This concoction was given in cases of heart trouble. When analysed, the active ingredient in the preparation was found to be digitalis. Naturally, it occurred in a much diluted form, balanced and almost checked by some of the other herbs. But some instinctive knowledge was at work which drove these herbalists to include digitalis leaves, long before medical science had discovered digitalin or the other compounds of foxglove.

The witches never used digitalis, from all we can gather, perhaps because it is so doubtful in its effect and so difficult to apply. You never know whether you survive. And folk medicine, though it has used about everything from bugs to human grease, has also shied away from pure foxglove—a marvellous soundness of instinct! They knew, it seems, that the chemists of the future wouldn't be much better off. I am not saying this to discredit science, but to show the limitations of chemical investigation.

Suppose you took a fruit cake and had it chemically analysed for all its constituent elements. Carbon, Hydrogen, Oxygen would appear in it in so many different combinations that you would never get down to what makes *your* fruit cake so different from the one a poor bachelor buys at the grocery store. But these relatively gross differences which we taste right away are much more pronounced than the differences between various substances finally crystallized from a few pounds of digitalis leaves. It's easy to find the elements, but it is very hard to determine whether and how they stay combined. Organic gardeners know this very well from their magazine; they do not feed elements to their plants, but organic matter for all it is worth.

When you ate Christmas cookies cut out in the shape of a man or a

horse, you probably did not realize that in ancient times this meant some magical rite—these figures were symbols to represent something. If a man ate a cake or cookie of a gallant rider on a prancing horse, he meant to incorporate in himself the strength of both. He believed that he had done so and was, accordingly, more fearless when he had to face an enemy. It worked, as far as he was concerned. This, in turn, strengthened his belief in the efficacy of a little magic. If we could find out why the Digitalis was connected with the fox, we might perhaps learn something else about magic; but perhaps it was merely a poetic association; for primitive people are quite poetic. Mr. Anderson tells me that the Norwegians speak of fox bell, while the Russians and Germans translate Digitalis plain and simple—thimble. Or rather, we should say, Linnaeus in naming this plant translated its common name into Latin. This, at least, proves that thimbles were quite well known at the time of Linnaeus and before.

Gadget—The Seeder

RULES about seeding are quite varied, but they never take account of the wind. It is easy to make rows in a flat and place seeds there by tapping the seed packet gently as you move along. But where you sow in the open, you are never so sure of the right spacing. The wind blows your seeds partly to the side. Fine seeds are supposed to be mixed with sand, but when you strew them around, the sand drops closer because it is heavier. Some seeds are supposed to be raked in, but when they germinate you discover that you raked them into a corner. Then there are depredations of birds and the washing out by rains, the impatience of clammy fingers and the variable value of seeds. In the end, you always have a full bed just the same because as home gardener you are apt to take all of these dangers into consideration and sow too densely. The average seed packet contains too much for the small garden. A good many of these troubles can be controlled by the perfectionist gardener—he resorts to a good seeder. There are various devices made of paper and controlled by two fingers; these devices are cumbersome and unreliable in average sowing weather. The more reliable kind is shown in the picture. It releases one seed at a time. But light seeds, like lettuce, which nobody sows one at a time, had better be sprinkled out of the original packet. With the seeder shown you must also guard against the tendency to plant too deeply. Cover your seed just about twice or three times its diameter. In other words, lettuce stays right on top, beans go a few inches down.

The Earth's Organic Cover

By H. C. HAAS

WE have on this earth what might be called the topsoil, that layer of normally loose, spongy and porous matter which nurtures plant life directly and animal life indirectly. It harbors the topsoil life, most of it too small to be seen with the naked eye but large enough in number to bulk large. How large in comparison with the bulk of visible forms of life the writer will leave to conjecture. The topsoil depth varies widely, from nothing to several feet, depending on latitude, height above sea level, weather, topography and too often upon the selfish and thoughtless machinations of man.

The topsoil layer is only a part of what may be called the "organic cover" of the earth, a very mobile and "fluid" layer, though most of the individual units making it up appear to us as solids. These vary in size from the ultra-microscopic to elephants and whales, dinosaurs prehistorically. Some of the units are semi-fluid, particularly among those living in water, but most have skin or shell covering, over bodies that are mostly water. All life, all living creatures, animal or vegetable, in the air, on the land or in the water are included in the organic cover, extending from one pole to the other. The cold of winter, which goes to the extreme at one pole in January, at the other in June, will render dormant or lifeless many forms, but certain fur clad or feathered creatures can survive even there.

It can be shown in many ways that it has been a wise plan of nature to keep the organic cover in continual motion as though it were a liquid stirred with a spoon to keep it homogeneous throughout. The mobile birds fly immense distances, the fish swim very far and the most vigorous among men and animals are those which are of wayfaring habits.

The action of the wind and of flying creatures in first broadcasting the pollen of plant life and then its seed far and wide is the best means plant life has in moving from place to place. Thus it secures maximum nourishment, vigor, and ability to survive. Plants are "rooted" to the soil but even they, on occasion can "walk" by extending both roots and branches to one better side, flourishing there and perishing on the other side, keeping up the movement as long as there is inducement to move.

Microscopic life obviously cannot move far by its own power, but rain, winds and tornadoes can move it great distances in considerable bulk and all other forms of life that move carry it unwittingly with them.

Hence it can be said that all forms of life, all units in the organic cover, through the whole range from the smallest to the largest are wont to scatter widely over the earth. Wide oceans and mountain ranges act as barriers to considerable extent. Witness the many forms of life found in Australia and nowhere else. All continents have flora and fauna peculiar to themselves, that thrive best on the weather and soil conditions existing where they are. Man is unique in being able to survive anywhere on earth but even he must become acclimated, and his skill in providing himself with artificial body covering, artificial shelter and stored food has been a factor, also his ability to have food brought to him from all over the world.

The champion traveller is a certain strain of that small slender gull-like bird, called the tern, which lives in the Arctic when it is warmest there,

during the period of continuous daylight co-extensive with the northern summer. When the sun begins to dip too far below the horizon, when ice and snow begin to thicken, rendering the food supply less accessible, the tern of this particular strain will fly about 12,000 miles from Arctic America, across the North Atlantic to Europe, thence through Africa to the Antarctic Ocean where he enjoys possibly a change of food, but temperature, light and other conditions similar to those he had in the Arctic. Six months later he flies back. 24,000 miles per year under his own power, not including the local flying!

The whales, sharks and larger fish, as every one knows, traverse the oceans.

George Sheffield Oliver, describing the habits of the earthworm in Gardener's Book Club Pamphlet No. 8, writes that many species of earthworm peregrinate, that is, they travel and migrate extensively, scaling and crossing even mountain ranges. Even the lowly earthworm does it!

We can now pass on to a description of another potent agency in the homogenization of the organic cover—the agency of sex.

Sex was brought about by nature (evolution if you like) to permit variations, the offspring rarely being exactly like either parent but varying more or less from both, often showing reversion to some ancestor on either side more or less remote. Certain variations, sometimes slight, sometimes not slight, help in the ability of the individual to win in the struggle for the survival of the fittest.

It has been most interesting to note from the pamphlet "Luther Burbank" by Roger W. Smith, known to Organic Gardening readers as No. 6 in the Gardener's Book Club series, that one of the secrets of Luther Burbank's phenominal success was the careful mating of individuals of the same or closely related species but of wide difference in origin as to geography. The hybrid walnut resulting from the crossing of the Eastern Black Walnut with the California became twice as tall and grew as fast as both its parents put together.

Charles Darwin in "The Origin of Species" writes of "the almost universal belief of breeders that with animals and plants a cross between different varieties, or between individuals of the same variety but of another strain, gives vigor and fertility to the offspring; and on the other hand, that close interbreeding diminishes vigor and fertility." Elsewhere in the same book he states "It is an old and almost universal belief, founded on a considerable body of evidence, which I have elsewhere given, that slight changes in the conditions of life are beneficial to all living things. We see this acted upon by farmers and gardeners in their frequent exchanges of seed, tubers, etc., from one soil or climate to another, and back again. During the convalescence of animals, great benefit is derived from almost any change in their habits of life. Again, both with plants and animals, there is the clearest evidence that a cross between individuals of the same species, which differ to a certain extent, gives vigor and fertility to the offspring; and that close interbreeding continued during several generations between the nearest relations, if these be kept under the same conditions of life, almost always lead to decreased size, weakness, or sterility."

Westermarck in the voluminous "History of Human Marriage" writes along the same lines that the mating of individuals of widely different strains, that is, of different so-called "races", results in vigor and fertility of the offspring. Inbreeding, the so-called "endogamy," too long and too often persisted in, that kind of intermarriage that would result among a small group of human beings on a small isolated island, or even in the middle of a vast continent but isolated in any way, as by mountain barriers, segregation, prejudice, or illiteracy, will result in physical, mental and moral deterioration.

Hence, whether plants, animals or human beings are being considered, it is fitting that, for the maximum vigor and health of all, "nature cast her seed far and wide". Let us not be misunderstood. The mating of human individuals should generally be far afield, but the mating must be for life.

The mixing of the earth's organic cover by the two agencies described above, migration and the mating of the sexes, has an object we hope to discuss in a later article. It began when the earth cooled enough to permit life, when the earth's water remained long enough below the boiling temperature. The beginnings of the earth being so veiled in obscurity, is it wrong to assume that the earth has always revolved around an inclined axis, and that life began at the poles, where the weather first became cool enough so that the water contained in all living creatures would not boil? That the forms initiated at the North pole were not the same as those initiated at the South pole, and not initiated at the same time? The organic cover was first all in water, warm or hot, and when it rose to the land it first was thin and of small extent, making a few unsuccessful starts before it became permanently established. The simplest forms, living very ephemeral lives, grew in complexity, size and variety and lived longer lives.

Consider only the human eye, developed from those simple beginnings over a time measured in units so large that the duration of all history sinks into insignificance. A pair of normal human eyes with the accessory equipment, bulking and weighing so little, have automatic variable focus over a wide range of distances, developed when man had to run from his enemies, automatic variable light admittance, automatic stereoscopic action, full and faithful color reproduction, automatic inversion of the image to place it right side up, automatic cleaning of the lenses—are there more?—and these eyes last in the normal individual three score years and ten, needing no repairs not automatically made, no servicing, no renewals—normally. The human ears likewise—27,000 nerve ends in an enclosure the size of a pea—the cochlea —distinguishing such minute differences in sound. All life that has survived evolution is similarly intricate and efficient, and all this is reproduced over and over again, not in one assembly line at one place that supplies the whole world but all over the world, wherever life exists. The assembly line products, machine made, man made, begin to wear, deteriorate, depreciate, get dirty, rust, corrode, right after completion, are not made where needed and used, but a thousand miles away, and they cost money for the initial cost, for freight, for upkeep, cleaning, renewal of parts, testing, servicing, and they last?—not three score years and ten—no—new improved models every year with trade-in—some can afford it.

It is these excellencies of nature that we should strive to preserve. We could not equal them in a thousand years of improved manufacture, even if we had the necessary coal and oil to make the attempt.

It is being printed that we are to have six lane superhighways with speeds at seventy miles per hour, that the railroad passenger trains are to be run at one hundred miles per hour to compete with the air lines, and the air lines will do all but arrange trips to the moon. All this is not going to benefit in the least all that life that has co-operated with mankind, since man rose from the primates, for the continued existence of all.

Let us build to permit posterity to exist. To co-operate with the earthworms men need not scoot around at one hundred miles an hour. The worms cannot go along. In building all these Bomb vulnerable factories and all the other essential parts of our machine age, it is to be doubted that we have made progress—we have been destroying the organic cover, and of all the planets only the earth can have one such as that in our keeping.

Reader's Correspondence

Send stamped self-addressed envelope for reply.

CACTUS BLOOMING

Q. One thing has troubled me from time to time: What to do to make a cactus bloom. I have several Christmas cacti that have bloomed before, but refuse to bloom again. Would you please make some suggestions as to what I can do?

C. J. B., Braddock, Pa.

A. Many plants, especially cacti, have a strange rhythm of growth and flowering. As long as they can grow steadily, they do not reproduce and therefore refuse to flower or set seeds. On the other hand, flowering and seed production is a heavy tax on any organism, and some plants cannot flower unless they have made a good growth beforehand.

Since we do not know how you treated your plants, we discuss both aspects.

If you have transplanted them regularly in good soil with ample nourishment so that they could make a good growth, they may have refused to bloom because the pots were too large. They could just keep growing without attending to reproductive processes by flowering and seeding. In this case, keep them in the same pots a bit longer until their roots fill out the pot. They can thus be forced to produce flowers.

If you have not transplanted them, they may not have enough nourishment available. In that case you repot them next spring. It will be good to shake out the old earth, to prick off some lengthy roots in order to stimulate new root growth, and to put them back in the next larger size of pots filled with good earth. They will then grow and bloom at the proper time.

Plants that are kept in heated rooms do occasionally suffer from the fumes and gases of the heating system, especially where gas fumes escape. In that case, you want to be sure that they are well protected.

Sometimes, plants are checked by changes in temperature, especially when they are in drafty windows. That too can be remedied. While under natural conditions in the open, plants are adaptable, they become somewhat pampered inside the house and respond by refusing to grow or to bloom. If you give them a good hardening outside during the next summer, you can stimulate them in this respect so that they overcome the unfavorable conditions in warm rooms.

—o—

STRAWBERRIES

Q. Please tell me how to grow strawberries.

J. L. C., Philadelphia, Pa.

A. All depends on whether you want high grade berries or great numbers. In the first place, you plant berries in hills, in the second, you plant them in rows and let them spread. The latter is called "matted system" and is most widely used. Different varieties make different amounts of runners and must be spaced accordingly. In that respect you can follow the advice of the nursery that supplies you with the original plants. A certain amount of thinning is necessary if you want high yields, because even the richest soil would otherwise suffer. Too dense a stand simply cuts down on production. If you can dip the plants into a mud made of colloidal phosphate, your yield will be increased. Dip only the roots of sturdy,

well-rooted plants and discard the weaklings. Set the plants a little deeper than they were in the nursery, as soon as you receive them. Pull the excess runners as the plants begin to spread. If you have good compost, your berries will respond favorably. You can, after planting and first fruiting, add compost topdressings, but you should also try to use a mulch of pine needles between the rows. Straw will serve as winter mulch on top, but had best be removed in spring because it will in our moist area attract slugs and snails that attack the berries. Pine needles seem to be some protection against slugs, though picking these enemies by hand will probably be necessary under our conditions. You can obtain very good bulletins from the Superintendent of Documents, Washington, D. C., on strawberry growing in this and every other region of the United States. There the best varieties for the climatic and soil conditions are recommended. But if you order from a nurseryman in your region—we call special attention to our advertisers, who are proven nursery people of long standing—he will advise you through his catalogues. It may be best for family purposes to order different varieties so that you have a succession of fruits through a long season or through the year. The more you put in the soil at first, the better the result. And you cannot overdo composting in this case, since strawberries definitely love rich organic earth. A piece of ground, 40 by 100, can easily be prepared with two to three tons of compost, and four will not do any damage, especially not if you have used phosphate rock or colloidal phosphate in making it.

—o—

GRAPES AND LIME

Q. Do grape vines require lime or otherwise? I have many books and pamphlets on gardening but have never found the answer to this question.

F. J. W., Springvale, Me.

A. It would only be as the result of some very unusual soil condition that lime would be required for grapes.

—o—

GRAPE RESIDUES

Q. Have you tried to compost grape residue—after the juice has been extracted—stems, skins and seeds?

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Especially the seeds. Will lime break them down?

We have four factories here processing grapes and there is a lot of this grape residue. I'd like to convert this waste into compost if it is practical and economical to do so.

L. S. C., Grandview, Wash.

A. Grape residues are very rich in natural yeasts and can be easily composted. It is, of course, necessary to mix that material with other matter. You can use for that purpose, straw and other bulky substances which permit air to get into the heap. If you would use only the grape residue, be sure, however, to add also animal manure or some other animal matter, such as commercial chicken manure, hoof and horn meal or dried blood. That will give you perfect compost.

—o—

MILLS

Q. On page 21-26, Mildred Jensen Loomis writes on "Our Daily Bread" and speaks of an electric home milling device. I need one of these electric home mills, and would appreciate Miss Loomis' address so I can inquire where it may be bought.

M. E. S., Red Bank, N. J.

A. Unfortunately, the Arcade Milling Company, Freeport, Ill., makers of the electrically run mill costing $9.90 and described in the booklet, have discontinued its manufacture. However, you might write to them in an effort to locate one of these mills. The Duplex Mill and Mfg. Co., Springfield, Ohio, manufactures mills, and it is suggested that you communicate with that company, mentioning our name.

—o—

HOW MANY MINERALS?

Q. Referring to the article in the Sept. 1st issue of the Saturday Evening Post "Are We Starving to Death" —where may I obtain practical useful

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information applicable to my garden soil so as to obtain vegetables and fruits with the correct percentage of the 16 essential minerals?

I have written this question to several people who should know the answers and so far the sum of the replies has been—"Do not know—or—ask someone else."

What can you write me to clarify this puzzling situation?

T. E. B., Geneva, Illinois.

A. The question is not whether there is *one* correct percentage of essential minerals. Plants and animals and humans are quite adaptable and must be so in order to survive under varying conditions. As a result, plants differ in their composition, according to soil and climate conditions. There is no one norm, which you could strive for, but there is one direction in which you can go to produce healthy plants, which in turn will give you healthy food and that is the compost method.

As you follow our magazine, you will find in every number, one or two articles or items which will help you understand these questions. The reason why nobody has given you a definite answer is that there cannot be a definite answer. If there were, corn would grow in Illinois on one kind of soil, but not in Iowa or in Texas. The fact that corn grows over such a wide variety of soils, with an entirely different mineral composition, will show you that you need not worry about percentages. If you apply compost regularly, you supply all crops with plant food and at the same time make more soil minerals available for the plants.

—o—

BLACK KNOT

Q. Is there any way to control and eradicate black knot in plum and prune trees?

J. H. B., Franklin, N. Y.

A. The only real solution for black knot is the elimination of all the diseased parts. Once you allow the spores

to spread, the disease may get out of hand, but fortunately black knot is not as active as some of the other plum diseases and can be controlled by vigorous cutting.

—o—

ORCHARD METHODS

Q. How shall I change over to the organic method in an orchard which has been subjected to the customary sprays?

A. E. K., Poughkeepsie, N. Y.

A. Naturally, in cases where a person is operating a commercial orchard we recommend a gradual change over a period of years, by building up the strength of the trees and soil conditions, to develop an immunity against disease and insects. Where the trees have been accustomed to spraying, this cannot be eliminated at once. However, as soon as the spraying has been completed, composted material can be applied to the soil around the trees to re-establish bacterial activity in the area to benefit the trees during the fruiting period and in the formation of next year's fruit buds. As one adopts Organic methods, increases the applications of compost and various cultural methods, spraying requirements decrease and the quality of the fruit improves.

—o—

ROASTED BONES

Q. Are cooked and roasted bones still of some value to the soil? If so, how should they be applied?

A. P., Brooklyn, N. Y.

A. Cooked and roasted bones are of value to the soil, but must be ground up instead of being composted "as is". This material should not be applied to the soil without being broken down. If you have a grinding machine, you can utilize these bones; otherwise, it might be more economical to purchase ground bonemeal.

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EARTH

Q. Will you please inform me whether it will do any harm to mix only weeds and lime with compost instead of soil, as it is quite impossible to get soil from my acre and still keep it a beauty garden?

A. S., Roanoke, Va.

A. I got most of the earth for my compost pile by changing the paths in the garden. In fact, a good deal was dug up right around the compost pile itself. Since all this earth will go back into your garden, that is not a very serious job. You will have to add some dried blood or hoof and horn meal, otherwise you will not get good compost without manure. Weeds and lime alone are not sufficient.

—o—

SEEDLINGS

Q. Would you tell me how to raise seedlings of various kinds for the vegetable garden? How do you start them inside, how do you thin them out? Do you have to dust them? What kind of flats and soil do you use? What varieties do you recommend? How do you test seeds?

S. K., Philadelphia, Pa.

A. Although we hope to have a booklet by Miss Speiden on this question before long, we think your many questions deserve of a complete answer. The home grower need not test his seeds for viability, because the responsible growers and dealers who advertise with us have viable seed. We do not recommend special varieties, because every region has different ones that are most suitable ,as you can see from the descriptions in the better catalogues. Make your own choice and try different varieties to find which suits you best.

The majority of the garden seeds can be sown in the open; spinach, beets, carrots, parsley, cabbages of all sorts, lettuce, salsify, turnips, onions,

leeks, etc. are all sown into the field. Cabbages and Cauliflowers may be sown inside and transplanted, but the check is great and sometimes detrimental. Transplanted cabbages are easily attacked by ants, cutworms, etc., when field-grown plants survive without trouble. Warm weather plants however are best raised in flats. You can raise in this manner the following: Tomato, bean, cucumber, pepper, eggplant, (and, if you want, celery, celeriac, cabbages, lettuce).

You had best buy regulation flats from the seedsmen; they are made of cypress wood and have paper plant bands which allow you to lift the plants out and plant them with the container, which then will decay in the ground. This is best for tomatoes, cucumbers and beans.

The small-seeded plants are sown in rows in such flats. If the soil is mixed with coarse sand and wetted down and if the seeds are not sown too closely, you will as a rule have no damping off. To be extra safe, you can sprinkle a thin layer of fine sphagnum moss on top and sow on it. These flats should not have a soil too rich in nutriments. The seeds will germinate, almost all of them. You first see the seed leaves or cotyledons, then the first real leaves. When you have two of these, you pick the little plants up with a knife blade or a wooden marker and transplant them into another flat, either into the plant band squares or in rows. Three to five across a standard flat is right, depending on how long you want to keep them in the second flat. This flat again should not be too rich in nourishment, because rich soil produces quick growth and spindly appearance, which causes a check when the plants are finally put out in the open. Before you do so, leave the flats outside

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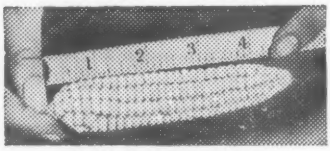

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for a couple of days to harden off the plants.

A warm window is enough for the start. But if you are in a hurry and can place the seed flats on a radiator pipe for a short time or better, above it, where it gets around 60 degrees, you can hasten germination. In watering, use a fine rose or, better still, set the flats in a washtub or the like to let the moisture soak in from beneath.

For planting in the open, use a cloudy day and preferably plant in the evening, because the plants get established a bit over night. The more roots remain with them the better they take hold. Water them after setting them out and see them grow.

—o—

HILLSIDE GARDEN

Q. I am very much interested in your compost piles. My garden is on the hill, facing west and north. How can I prevent the soil and compost washing off?

M. G., Bethel, Ohio.

A. A good way of treating a hillside is by making small terraces so that the beds slope toward the hill instead of away from it. On such a terrace, you could make your compost. I would also advise that you plant a few perennials across your garden so that their roots hold the soil.

—o—

ASPARAGUS

Q. Two years ago last April I made an asparagus bed, by digging a regular pit about 16 inches deep, and put about 12 inches of well rotted mixed manure in the bottom, and then about 2 inches of black earth taken from a muck plot on our place, and then the roots were spread out setting the crowns about 12 inches apart, then the remaining 2 inches were filled in with a mixture of black and clay loam earth.

Last year we did not allow the young shoots to get more than about

6 inches long until late summer when we quit cutting and allowed the stalks to go to seed, the bed was mulched with about 6 inches of wheat straw, this was removed the middle of April this year, but so far this year the shoots are not near as sturdy and are fewer and do not grow as well as last year.

This bed is located *within a few feet of three six year old walnut trees,* would these walnut trees have any effect on the asparagus roots, or what did I do wrong or what didn't I do? I hope I have made the condition clear.

H. F. C., Detroit, Mich.

A. It is quite possible that you cut too many of your shoots. As you know and will find more carefully explained in our booklet on *Leaves,* it is the green leaves which assimilate from the air the substances which go down into the roots and shoots. If the plants have no good chance of assimilating such materials, next year's crop will be scarce. If your shoots are thin and few, you can be sure that this is what happened. In that case, you want to go easy on this year's cutting. Also, your bed is too close to the walnut trees.

—o—

BORON DEFICIENCY

Q. How can I tell whether my soil is boron-deficient or is this necessary on organic soil?

E. S., Harvey, Ill.

A. The appearance of the plants may give some evidence of this. For example, in your section of the U. S., symptoms traceable to boron deficiency have been observed on a number of legume species, with red coloration, sometimes with a purplish tint, affecting first the margins or the tips of the leaves. The abnormal color spreads to take in the entire leaf surface, including the veins, while the leaf tips first affected die, becoming dark brown when the red pigment has dis-

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integrated. The leaves affected are distributed over the entire plant, the condition being most marked in the younger portions. The symptoms are similar in red clover, alsike, Korean lespedeza, and, to a lesser extent, in alfalfa. In alfalfa, the red to purple coloration is associated with yellow, and the symptoms are more definitely centered at the top of the plant. In western U. S. and Canada, a yellowish condition (commonly called "yellow-top") affects the upper portions of the alfalfa plant, and the red color is not present to a marked extent. In the case of alsike plants, boron deficiency sometimes manifests itself by malformation of the plants at the blossoming stage.

Soil samples might be taken from several sections of your farm and forwarded to your county agent or nearest experiment station or agricultural college for testing for boron deficiency. Should doubt exist, you might apply 20 pounds of borax per acre. Of course, until the Spring and Summer nothing can be done in the matter. Even when organic methods are followed, applications of borax are sometimes desirable to correct a condition of boron deficiency.

—o—

SOW BUGS

Q. Could you give me some advice about sow bugs in my compost pile? I have followed directions rather carefully except for turning it. It is about three months old and the bugs appear in the center of it. Can something be done so the heap will still be usable?

C. H. R., Los Gatos, Calif.

A. By keeping the heap properly moist, you can reduce the sow bugs considerably, but, as you know, there is no method of disposing of them altogether. If you can induce lizards, snakes and especially toads to stay around, you will have the best method of getting rid of them. As a rule, they do not attack living plants where decayed material is available.

PINE NEEDLES

Q. Will you kindly give me your opinion on the effect of decomposed pine needles on plant life?

I like to use partly rotted oak leaves in my composts but seldom get it without at least a sprinkling of pine residue. So, hoping for the best, I have been using the mixture. I hope with no harm to my soil.

I wonder if you have ever examined the effecct of pine on a compost. Are pine needles merely undesirable or does the turpentine extend to them from the trunk and make them injurious, perhaps even toxic, to the roots of plants? I should be obliged for your opinion.

L. L., Twin Beaches, Fla.

A. Pine needles would be excellent as a mulch for strawberries or other acid-loving plants. Pine needles are not generally recommended for composting, as they are quite difficult to break down and incline towards acidity, necessitating the use of lime to counteract this effect. As you have only been using a very small quantity of pine needles, and in combination with partly rotted oak leaves, it is not felt that you need worry about any injury to the soil or plants.

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A list of the present year's publications shows what a wide range is covered by the Gardener's Book Club. We first issued *The Fruit Orchard,* abounding with practical information and unusual data on fruit growing. The next booklet was derived from our editorial work in Organic Gardening, bringing *Questions and Answers on Compost.* Then a small encyclopedia was written by Dr. Meyer on *Leaves And What They Do.* This booklet was richly illustrated, as was Professor Headstrom's book, *Animals and the Gardener,* which followed as No. 4. During the fifth month, members were surprised by a beautifully printed book, dramatically written by J. I. Rodale, entitled *Sunflower Seed —The Miracle Food.* It goes without saying that so much interesting information could never be packed in magazine articles. Then plant breeding had to be looked into, and Mr. Roger W. Smith wrote *Luther Burbank.* During the seventh month, members received one of the most astounding gardening books ever written, *Root Development of Vegetable Crops* by Professors Weaver and Bruner, a well-known classic and practically unavailable until this reissue in condensed form. But nothing of the important substance has been trimmed off the book. No. 8 is the famous earthworm classic, *Our Friend, The Earthworm* by George Sheffield Oliver, which has long been out of print. No. 9, a series of new and selected works by Sir Albert Howard, entitled *The War in the Soil,* represents a magnificent summary of the organic cause.

No. 10 will be Dr. Pfeiffer's *Weeds And What They Tell Us,* an invaluable guide for gardener, farmer, and would-be buyer of land. For here an expert deals with weeds as indicators of soil conditions.

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The Critics Hail

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By J. I. RODALE

Introduction by Sir Albert Howard

PAY DIRT, *Farming & Gardening with Composts*, which we published late in October, is making a deep impression on America's farmers and gardeners. The critics of farm and garden papers, and critics of literary and general papers and magazines — amateur or professional gardeners themselves — have hailed it as a most important book for everybody to read. Here are brief quotations from a few of many reviews. If you haven't read PAY DIRT you are missing something good.

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